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Balance of the Waste Tank Farm Radioisotope Inventory Report

Cognizant Author: J. M. Fazio

Cognizant Manager: L. E. Rowell

WVNSCO
West Valley Nuclear Services Company

10282 Rock Springs Road
West Valley, New York USA 14171-9799

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List of Acronyms

A&PC	Analytical & Process Chemistry
CFMT	Concentrator Feed Makeup Tank
CMP	Characterization Management Plan for the Facility Characterization Project (WVDP-403)
CPC	Chemical Process Cell
HEPA	High-Efficiency Particulate Air
HLW	High-Level Waste
MDA	Minimum Detectable Activity
NFS	Nuclear Fuel Services
PNNL	Pacific Northwest National Laboratory
PUREX	Plutonium Uranium Extraction Process
PVS	Permanent Ventilation System
STS	Supernatant Treatment System
THOREX	Thorium Uranium Extraction Process
WVDP	West Valley Demonstration Project
WVNSCO	West Valley Nuclear Services Company

1.0 Introduction

This report provides a conservative curie inventory for the balance of the Waste Tank Farm for use with performance assessment modeling. Evaluation and characterization activities were conducted in accordance with WVDP-403, "Characterization Management Plan for the Facility Characterization Project" (CMP)[1].

The approach used to evaluate the balance of the Waste Tank Farm and generate the inventory estimate involved the following steps:

- Collection and evaluation of existing/historical information and data;
- Determination that additional data was needed to be collected to construct the inventory estimate;
- Collection of additional data;
- Preparation of dose-to-curie computer models; and
- Application of a conservative set of scaling factors to the modeling results yielding a conservative radioisotopic inventory for the units.

2.0 Balance of the Waste Tank Farm Description

The balance of the Waste Tank Farm refers to the equipment, piping, and structures, located within the fenced-in area known as the Waste Tank Farm not previously characterized as part of the Supernatant Treatment System (STS) Valve Aisle and Waste Storage Tanks 8D-1, 8D-2, 8D-3 and 8D-4. The balance of the Waste Tank Farm would therefore include the Sludge Mobilization System, High-Level Waste (HLW) Transfer System, the STS Support Building, the Waste Tank Farm legacy pipelines, the permanent ventilation system, equipment shelter, the Con-Ed Building, and the Tank 8D-2 M-8 Riser Pump Pit. Reference drawings are provided in Appendix A.

The Waste Tank Farm is located approximately 300 feet north of the Nuclear Fuel Services (NFS) Process Building. The Waste Tank Farm facilities were constructed in the 1960's for storage of aqueous wastes generated as a by-product of spent nuclear fuel reprocessing operations. These aqueous waste streams were principally generated from the solvent extraction process performed in the extraction cells where dissolved nuclear fuel, an aqueous waste stream containing uranium, plutonium, and fission products, was contacted with a mixture of tributal phosphate and n-dodecane to separate the uranium and plutonium from the fission products. The fission products in the aqueous waste stream were transferred to Tanks 8D-2 and 8D-4 in the Waste Tank Farm for storage.

2.1 HLW Transfer System (Transfer Trench and Pits 8Q-1, 8Q-2, 8Q-3, and 8Q-5)

The HLW Transfer System is composed of three pump pits, a diversion pit, and the Waste Transfer Trench (see Figure 1). The HLW Transfer System directly supported HLW processing activities associated with the transfer of HLW waste from the Waste Tank Farm to the Vitrification Facility.

Pump Pits 8Q-1, 8Q-2, and 8Q-4 located at the respective storage tank on top of the tank vaults, and Diversion Pit 8Q-5 accommodates the piping, valves, and upper section of the waste removal pumps along with other equipment required for waste transfer. Piping to equipment connections within the pits is made through remote connectors called jumpers. Equipment access is gained through removable one foot six inch thick pre-cast concrete pit covers. The pits are reinforced concrete structures internally lined with stainless steel. All pits are approximately six feet deep and vary in size from 6 feet by 7 feet to 13.5 feet by 12 feet. Pit walls and floors are nominally one to two feet thick. The tank access riser for each of the respective waste removal pumps penetrates the pump pit floor. The liner slopes to a low point drain connected to the removal pump access riser. Each pit accommodates the equipment required to process the waste out of

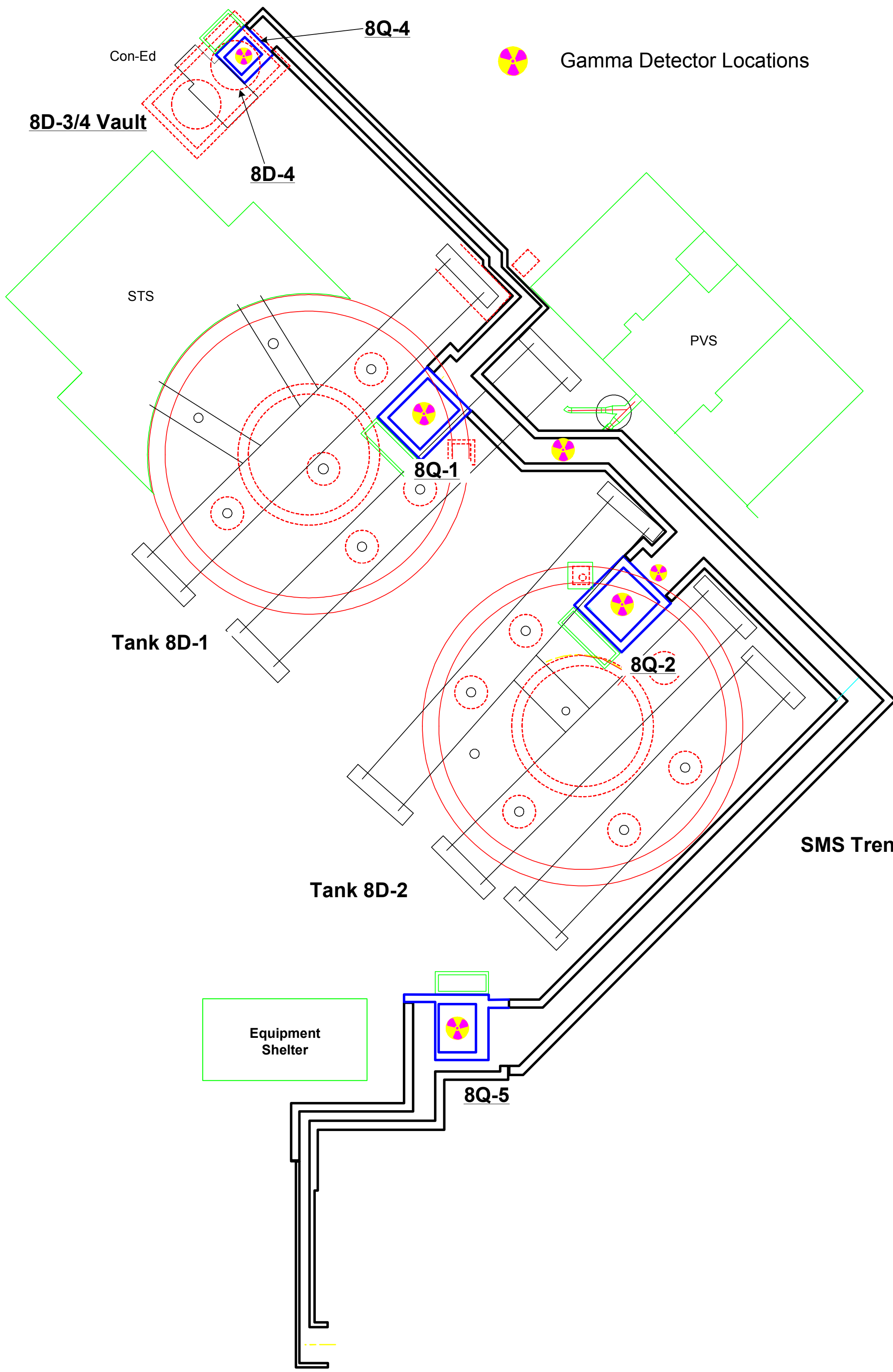


Figure 1

High-Level Waste Transfer System

the respective tank (i.e., removal pump, discharge piping, and flow monitoring equipment for controlling waste transfer operations). Unique to the 8Q-2 Pump Pit is particle size reduction equipment for size reducing the zeolite transferred from Tank 8D-1 to 8D-2. Zeolite is an ion sieve used to remove Cs-137 from Tank Farm liquids.

The HLW Transfer Trench is a long concrete vault containing double-walled piping that was designed to convey waste between the Waste Tank Farm and the Vitrification Facility. The HLW Transfer Trench is approximately 500 feet long, extending from the Tank 8D-3/Tank 8D-4 Vault along the north side of Tanks 8D-1 and 8D-2, before turning to the southwest and entering the north side of the Vitrification Facility. The trench is 6 to 20 feet wide and its height ranges from six to nine feet. The HLW Transfer Trench was constructed of reinforced concrete walls and pre-cast concrete covers. The walls of the trench are 18 to 24 inches thick and the pre-cast covers are two feet thick. The floor slab of the trench is one foot thick concrete. Wastes are conveyed through approximately 3,000 feet of two- and three-inch double-walled, butt welded, Schedule 40 stainless steel transfer piping contained within the transfer trench. No leaks of radioactive liquids from the transfer piping contaminating the transfer trench are known to have occurred based on routine sampling of the Transfer Trench Sump.

The HLW Transfer System was constructed by the West Valley Demonstration Project (WVDP) in the early 1990's to support the waste handling needs for the HLW Vitrification Project. There were three distinct phases of operation that the HLW Transfer System supported: zeolite transfers from Tank 8D-1 to Tank 8D-2, thorium uranium extraction process (THOREX) transfer and neutralization from Tank 8D-4 to Tank 8D-2, and HLW sludge transfer from Tank 8D-2 to the Vitrification Facility. During vitrification operations, the HLW System transfer piping and pit jumpers were routinely flushed with at least one line volume of water after each transfer. At the conclusion of vitrification operations more aggressive flushing was completed with one molar nitric acid followed by a utility water flush.

There was no historical radiological survey data located for the HLW Transfer System with the exception of the 8Q-2 Pit. Dose rate surveys of the 8Q-2 Pit taken on February 21, 1998 ranged from 80 mR/hr to 5 R/hr(2). The radionuclide distribution for the HLW Transfer System can be conservatively bounded by the Batch 10 HLW radionuclide distribution which was derived from a sample of the first HLW transfer to the Vitrification Facility from Tank 8D-2. Data from later HLW transfers indicate that the ratio of alpha-transuranics to Cs-137 steadily decreased over time.

2.2 Permanent Ventilation System Building

The Permanent Ventilation System (PVS) Building is located at the north perimeter of Tank 8D-2 and measures 75 feet long, 40 feet wide, and 16 feet tall (see Figure 1). The PVS Building contains four rooms which include the PVS Room, the Electrical Room, the Mechanical Room, and the Control Room. The steel structure is attached to the concrete floor of the building. The concrete floor is one foot thick and the entire structure is supported by concrete footings. The PVS Building has a sheet metal roof which supports the PVS Discharge Stack. The PVS is designed to provide ventilation to the STS Support Building, STS Valve Aisle, STS Pipeway, and the HLW Tanks during radioactive operations. Air flow from these facilities is directed to the PVS where it passes through a mist eliminator, heater, roughing filter, and two sets of High-Efficiency Particulate Air (HEPA) filters before being discharged through the PVS Stack to the atmosphere. Residual radioactivity is expected to be associated with the ventilation equipment.

A small, recently built, skid-mounted PVS Stack Monitoring Building is located near the east end of the PVS Building. Insulated samples lines lead from and back to the PVS Stack.

A routine radiation and contamination survey is performed weekly in the PVS Building during which dose rate measurements and contamination level information is collected. Dose rate measurements of the PVS Building taken in December 2003[3] ranged from 1 mR/hr to 60 mR/hr. The highest dose rates, as seen in the weekly surveys, are associated with the HEPA filter bank in the PVS Room. Based on the dose rate measurements collected, significant contamination would not be expected to remain in the PVS Room or in the ventilation system subsurface piping. Therefore, the PVS Building is not a key curie contributor in the balance of the Waste Tank Farm.

2.3 Equipment Shelter

The Equipment Shelter is a one-story concrete block building located immediately north of the Vitrification Facility (see Figure 1). The Equipment Shelter measures approximately 40 feet long, 18 feet wide, and 12 feet high and has a concrete floor six inches thick. A small extension on the west side of the Equipment Shelter is approximately nine feet long, seven feet wide, and five feet high, with a one foot thick concrete floor. The roof decking covering this structure is four inches thick. This structure houses the Waste Tank Farm Ventilation System that formerly ventilated the HLW tanks and the STS process vessels in Tank 8D-1. The ventilation system draws air through a condenser, a knockout drum, a heater, and two sets of HEPA filters and blowers before being discharged through the main stack of the Process Building.

A routine radiation and contamination survey is performed weekly in the Equipment Shelter during which dose rate measurements and contamination level information is collected. Dose rate measurements[4] from four locations in the Equipment Shelter taken in December 2003 ranged from 0.1 mR/hr to 2.8 mR/hr. Most of the radiological inventory in the Equipment Shelter is expected to be removed with the ventilation system equipment during facility decommissioning. Based on the dose rate measurements collected, significant contamination would not be expected to remain in the Equipment Shelter or in the ventilation system subsurface piping and associated condensate piping. Therefore, the Equipment Shelter is not a key curie contributor in the balance of the Waste Tank Farm and is not considered further in this report.

2.4 Con-Ed Building

The Con-Ed Building is a concrete block building constructed on top of the underground concrete vault containing Tanks 8D-3 and 8D-4. This building, which is 10 feet wide, 13 feet long, and 11 feet high, houses the instrumentation and valves used to monitor and control the operation of Tanks 8D-3 and 8D-4. As stated in WVDP-EIS-017[5], the Con-Ed Building is reported to be radiologically contaminated. The majority of the radiological inventory is believed to be contained within the piping and equipment inside the building.

A routine radiation and contamination survey is performed weekly in the Con-Ed building during which dose rate measurements and contamination level information is collected. Dose rate measurements[4] of the Con-Ed Building taken in December 2003 were 0.1 mR/hr. Based on the dose rate measurements collected, significant contamination would not be expected to remain in the Con-Ed Building. Therefore, the Con-Ed Building is not a key curie contributor in the balance of the Waste Tank Farm and is not considered further in this report.

2.5 STS Support Building

The STS Support Building is located adjacent to and on top of the Tank 8D-1 vault. The STS Support Building is a two-story structure that contains equipment and auxiliary support systems needed to operate the STS which was designed for the pretreatment of the HLW plutonium uranium extraction process (PUREX) supernatant and sludge wash solutions. The upper level of the STS Support Building, extending from a site reference elevation of 107 feet to the roof peak at

129 feet, is a steel framework structure covered with steel siding. The upper level is a radiologically clean structure that contains a control room, heating, ventilation and air conditioning equipment, utilities, and storage tanks for fresh water and fresh zeolite to support STS operations. The lower level of the STS Building, extending from 92 to 107 feet, was constructed with reinforced concrete walls, floor, and ceiling and contains an airlock, the shielded valve aisle, and an operating aisle. See Appendix A for drawings.

The STS Support Building was built on 68 55-feet long cast-in-place piles. Each pile was installed to a minimum depth of 15 feet into the Lavery Till unit. These piles were installed to provide additional structural support to the STS Support Building because the backfill soil around HLW Tanks 8D-1 and 8D-2 was not compacted after the tanks were built(6).

The shielded valve aisle is located on the first floor of the support building, adjacent to Tank 8D-1. This valve aisle contains remotely operated valves and instrumentation used to control operation of the STS. The shield walls of the valve aisle were constructed of 12-inch thick carbon steel and the ceiling was made from 14-inch thick carbon steel. The shield walls and ceiling are composed of three individual steel plates that are bolted together. The valve aisle is radiologically contaminated from valve and piping leaks(6). Removable hatches are above the valve aisle that provide access to the aisle for removal of large items.

The STS Pipeway/Shield Structure is located on top of the Tank 8D-1 vault adjacent to the first floor of the support building. This concrete and steel structure contains numerous piping runs and structural members that support the STS equipment in Tank 8D-1. Additionally, STS decontaminated supernatant piping and Low-Level Waste Treatment System concentrate return piping runs between the Process Building and the STS Pipeway. Significant contamination is not expected to remain in this piping.

Flushing of the STS equipment and piping was conducted in late 2000 and again in early 2002. Six flushing paths were identified to effectively flush residual solids from the STS process equipment and piping back into Tank 8D-2. Radiation probes were deployed in key locations for each flush to monitor flush effectiveness. Flushing was performed using dilute nitric acid and demineralized water(7).

The majority of the STS Support Building is not radiologically contaminated. Only the STS Valve Aisle and the piping within the Pipeway/Shield Structure is radiologically contaminated. The STS Valve Aisle radioisotope inventory has been determined and is reported in RIR-403-007(8). There was no historical radiological survey data located for the STS Pipeway/Shield Structure. However, jumpers in the valve aisle have been surveyed which would be radiologically similar to the Pipeway/Shield Structure piping. Dose rate measurements of a valve aisle jumper taken in May 1998 was 1,700 mR/hr(9). The radionuclide distribution for the STS Support Building would be the same as that derived for the STS Valve Aisle.

2.6 Waste Tank Farm HLW Legacy Piping

The Waste Tank Farm HLW legacy piping refers to the originally installed underground piping employed by NFS to manage the HLW wastes produced during spent nuclear fuel reprocessing operations. During NFS reprocessing operations, the HLW process piping was used to transfer the aqueous waste streams generated from the solvent extraction process and collected in the Chemical Process Cell (CPC) to the Waste Tank Farm. Since the end of reprocessing operations primarily laboratory wastes and to a lesser extent liquid accumulations from cell sumps have been transferred. These lines, which originate at the floor connections in the CPC, are approximately 500 to 700 feet long and are constructed of three-inch Schedule 40 stainless steel which gravity drain to storage tanks in the Waste Tank Farm. All reprocessing wastes, with the exception of the

THOREX waste, was transferred to the Waste Tank Farm via Line 7P-113 during NFS reprocessing operations. Subsequent to reprocessing, this pipeline has been flushed by the process plant decontamination solutions[10] and other miscellaneous wastes that were collected in Tank 7D-2 such as cell sumps and laboratory wastes.

For the transfer of THOREX waste to Tank 8D-4, Line 7P-120 was used. The other HLW pipeline, 7P-112, which serviced Tank 8D-1, was never used as Tank 8D-1 was the spare HLW receiver tank.

There was no historical radiological survey data located for the Waste Tank Farm HLW legacy piping. Radionuclide concentrations for THOREX waste are available for characterization of transfer Pipeline 7P-120 and the radionuclide concentrations for Line 7P-113 will be the same as current Tank 7D-2 wastes.

2.7 Tank 8D-2 M-8 Riser Pump Pit and Associated Transfer Piping

The Tank 8D-2 M-8 Riser Pump Pit was constructed on top the of the Tank 8D-2 vault over the M-8 riser where STS Transfer Pump 50-G-001 is located. This long shafted floating suction vertical turbine pump provided for the transfer of PUREX supernatant and sludge wash solutions from Tank 8D-2 to the STS for HLW pretreatment. Over the past several years, this system provided for the treatment of sodium bearing waste water. The 2½-inch diameter Schedule 40 304L stainless steel supply and return transfer piping is doubly contained in a 200 foot long, 20 inch diameter culvert pipe advancing along the south side of Tanks 8D-1 and 8D-2 to the STS. The return piping drains into a trough around the perimeter of the M-8 Riser to direct the flow back into Tank 8D-2. The M-8 Pump Pit is approximately 75 inches wide by 60 inches long by 90 inches deep and fabricated from ¼-inch stainless steel. Pit shield covers are fabricated of 4-inch thick carbon steel plates and stacked three high for a total thickness of 12 inches.

During STS flushing operations in November and December 2000, dose rate measurements were collected which ranged from 722 mR/hr to 1,244 mR/hr[11, 12, 13]. The radionuclide distribution for the M-8 Riser Pump Pit and associated transfer piping would be the same as that derived for the STS Valve Aisle.

2.8 Conclusion

In summary, based on the Waste Tank Farm operating history, decontamination records, historic radiological survey information, and available analytical data, the following areas of the balance of the Waste Tank Farm were identified as key curie contributing areas:

- HLW Transfer Trench Piping
- Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5
- STS Pipeway Piping
- Waste Tank Farm HLW Legacy Piping
- M-8 Riser Pump-Pit and Associated Piping

The other areas of the Waste Tank Farm, as explained above, are not considered to be key curie contributors to the balance of the Waste Tank Farm.

3.0 Historical Record Review

Referenced herein are existing reports and/or records that were found to contain general background information on the balance of the Waste Tank Farm. As discussed in Section 2.0, existing dose rate measurements and radionuclide distributions were used to identify the key curie contributing areas in the balance of the Waste Tank Farm. As discussed in Section 4 below, additional data is needed to be collected from the key areas to generate a curie estimate for the balance of the Waste Tank Farm.

3.1 Dose Rate Measurements/Surveys

During activities to remove expended equipment from the STS Valve Aisle in May 1998, STS Sample Jumper J-20 was surveyed. Dose rate measurements were recorded at contact of 1,700 mR/hr and at one foot of 1,300 mR/hr on the Radiation and Contamination Survey Report 060042[9]. The STS liquids contacting this jumper would be representative of the liquids also contacting the STS Pipeway/Shield structure piping and the STS Transfer Piping to the Tank 8D-2 M-8 Riser.

Dose rate surveys in the Tank 8D-2 M-8 Riser pump pit were performed in November and December 2000 and ranged from 722 mR/hr to 1,244 mR/hr. These surveys were performed per Work Orders 0001946, 0001985, and 0002260 and would be representative of the activity in the M-8 Riser pump pit following flushing operations[11, 12, 13].

3.2 Isotopic Distribution Information/Analytical Data

As described in Section 2.0, the HLW Transfer System directly supported HLW processing activities associated with the transfer of HLW from the Waste Tank Farm to the Vitrification Facility. Batch 10 vitrification run data was identified to be representative of the processing activities associated with the HLW Transfer System. Batch 10 vitrification run analytical results are available and are shown Table 1. The utilization of Batch 10 data[14, 15] to develop HLW scaling factors is considered to be conservative. First, the Batch 10 sample was collected from the first HLW transfer from Tank 8D-2 to the Vitrification Facility in 1996 and represents the waste at its most "concentrated" form with the highest ratios of key alpha-transuranic radionuclides to Cs-137. Since the time of this sample collection, processing of the supernatant in the HLW tanks continued through the cesium removal columns suspended from the roof of Tank 8D-1, selectively removing Cs-137 onto zeolite. The cesium removal columns were routinely emptied and the zeolite transferred back to Tank 8D-2 to be processed through the Vitrification Facility. This increase in the relative amount of Cs-137 in the waste resulted in the ratios of key alpha-transuranic radionuclides to Cs-137 to decrease over time. This makes application of the Batch 10 data conservative relative to defining a HLW distribution. The validation of the Batch 10 data is discussed in Section 6.0.

Relative to existing data that supports development of a radionuclide inventory for the HLW legacy lines, several areas were investigated. As discussed in Section 2, the THOREX waste radionuclide concentrations are available and the data is shown in Table 2 for characterization of Pipeline 7P-120. This data was obtained from samples of THOREX waste collected from Tank 8D-4 circa 1983 for the Waste Characterization Program to support the design the HLW pretreatment and vitrification processes[16]. Any residual wastes remaining in Line 7P-120 would be represented by the THOREX waste radionuclide concentrations as this line was only used for the transfer of THOREX waste to Tank 8D-4. As for Line 7P-113, any residual wastes remaining in Line 7P-113 would be best represented by the radionuclide concentrations of the liquids that have been collected in Tank 7D-2 and transferred to Tank 8D-2. Prior to transferring Tank 7D-2 to Tank 8D-2, a volume of Tank 7D-2 is transferred to Tank 3D-2 for sampling. The Tank 3D-2 radionuclide distribution from a sample collected in January 2002 is shown in Table 3.

For the STS Pipeway/Shield Structure and the Tank 8D-2 M-8 Riser Pump Pit, a conservatively bounding radionuclide distribution is available. As explained in Reference 8, the STS Valve Aisle can be bounded by the radionuclide distribution shown in Table 4. Tank 8D-1 fluid samples, STS flushing samples, valve aisle smear samples, and the Batch 10 radionuclide distributions were compared in RIR-403-007 to determine the conservatively bounding radionuclide distribution with a reference date of May 2, 2002. These scaling factors, as reported in RIR-403-007, would be appropriate for characterization here since all wastes processed through the STS Valve Aisle would also have been processed through the STS Pipeway/Shield Structure and the Tank 8D-2 M-8 Riser Pump Pit.

Table 1

Batch 10 Radionuclide Distribution

Project Isotope	Batch 10 Radionuclide Distribution (FCi/gram)
C-14	4.90e-04
Tc-99	8.45e-02
I-129	3.90e-07
U-233	3.60e-03
U-234	1.30e-03
U-235	3.80e-05
Np-237	2.00e-02
U-238	3.40e-04
Pu-238	3.96e+00
Pu-239	1.09e+00
Pu-240	7.70e-01
Pu-241	3.43e+01
Am-241	3.21e+01
Cm-243	2.58e-01
Cm-244	6.72e+00
Cs-137	2.85e+03
Sr-90	2.75e+03

- The radiological analysis of certain alpha-emitting nuclides does not permit ready discrimination between two nuclides of approximately equal energies. Nuclide pairs of particular interest for facility characterization include U-233/U-234, U-235/U-236, Pu-239/Pu-240, and Cm-243/Cm-244. The proportion of each nuclide's contribution to the combined activity was developed using historical analyses and ORIGEN calculations(17).

Table 2

THOREX Data

Project Isotope	THOREX 1987	
	Curies*	**Curies/Gallon**
C-14	1.30e-01	1.09e-05
Tc-99	1.04e+02	8.75e-03
I-129	1.80e-01	1.51e-05
U-232	2.74e+00	2.30e-04
U-233	2.09e+00	1.76e-04
U-234	2.17e+00	1.83e-04
U-235	5.17e-03	4.35e-07
Np-237	3.02e-01	2.54e-05
U-238	7.11e-05	5.98e-09
Pu-238	4.80e+02	4.04e-02
Pu-239	1.54e+01	1.30e-03
Pu-240	8.09e+00	6.80e-04
Pu-241	8.50e+02	7.15e-02
Am-241	2.41e+02	2.03e-02
Cm-243	2.34e-01	1.97e-05
Cm-244	1.37e+01	1.15e-03
Cs-137	4.57e+05	3.84e+01
Sr-90	4.54e+05	3.82e+01

* For 11,889 gallons of THOREX waste as reported in Reference 16.

Table 3

Tank 3D-2 Sample Data

Project Isotope	Tank 3D-2 Sample 02-1765 (FCi/ml)
C-14	9.97e-05
Tc-99	1.16e-04
I-129	8.21e-05
U-232	2.06e-05
U-233	8.60e-06
U-234	4.10e-06
U-235	3.30e-08
Np-237	5.17e-06
U-238	4.21e-07
Pu-238	1.37e-03
Pu-239	9.07e-04
Pu-240	6.93e-04
Pu-241	1.34e-02
Am-241	5.77e-03
Cm-243	2.49e-05
Cm-244	6.51e-04
Cs-137	2.32e+00
Sr-90	1.88e-01

- The radiological analysis of certain alpha-emitting nuclides does not permit ready discrimination between two nuclides of approximately equal energies. Nuclide pairs of particular interest for facility characterization include U-233/U-234, U-235/U-236, Pu-239/Pu-240, and Cm-243/Cm-244. The proportion of each nuclide's contribution to the combined activity was developed using historical analyses and ORIGEN calculations(17)

Table 4

STS Valve Aisle Scaling Factors

Project Isotope	STS Valve Aisle Scaling Factors May 2, 2002*
C-14	1.24E-06
Tc-99	2.13E-04
I-129	9.86E-10
U-232	8.83E-06
U-233	3.39E-06
U-234	1.62E-06
U-235	7.19E-07
Np-237	7.87E-06
U-238	5.57E-07
Pu-238	1.50E-03
Pu-239	4.60E-04
Pu-240	8.18E-04
Pu-241	1.06E-02
Am-241	1.27E-02
Cm-243	8.99E-05
Cm-244	2.19E-03
Cs-137	1.00E+00
Sr-90	9.61E-01

* From Reference 8.

4.0 Technical Approach/Data Gathering

From the review of the operational processes conducted in the Waste Tank Farm, available historic information, and previously generated data, the following areas of the balance of the Waste Tank Farm were identified as potential key curie contributors:

- HLW Transfer Trench Piping
- Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5
- STS Pipeway/Shield Structure Piping
- Waste Tank Farm HLW Legacy Piping
- M-8 Riser Pump Pit and Associated Piping

4.1 HLW Transfer System

4.1.1 HLW Transfer Trench Piping

The HLW Transfer Trench piping is contained within the 500 foot long concrete waste transfer trench. The approximately 3,000 feet of two- and three-inch Schedule 40 stainless steel piping was used to convey wastes between tanks within the Waste Tank Farm and to the Vitrification Facility for solidification. The interior of the waste transfer trench was last surveyed in January 2002. However, this data could not be validated due to a discrepancy in the probe and rate meter which was that the probe was not calibrated to the rate meter used. Therefore, new dose rate measurements were needed for the transfer trench. Using the new dose rates and the Batch 10 vitrification run isotopic data, the trench transfer piping could then be modeled, scaling factors developed, and a curie estimate calculated for the residual activity in the transfer piping (see Section 7.1).

4.1.2 Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

The Pits 8Q-1, 8Q-2, 8Q-4 and 8Q-5 are approximately six feet deep and vary in size from 6 feet by 7 feet to 13.5 feet by 12 feet. Each pit accommodates the removal pump, jumpers, and flow monitoring equipment required to process the waste out of the respective waste tank. The interior of pits 8Q-1, 8Q-2, 8Q-4 and 8Q-5 were last surveyed in January 2002. However, this data could not be validated due to a discrepancy in the probe and rate meter. Therefore, new dose rate measurements were needed for these pits. Using the new dose rates and the Batch 10 vitrification run isotopic data, the pits could then be modeled, scaling factors developed, and a curie estimate calculated (see Section 7.2).

4.2 STS Pipeway/Shield Structure Piping

The STS Pipeway/Shield Structure Piping is located on top of the Tank 8D-1 vault adjacent to the first floor of the support building. This concrete and steel structure contains numerous piping runs and structural members that support the STS equipment in Tank 8D-1. These facilities were designed for the pretreatment of the HLW PUREX supernatant and sludge wash solutions. There was no historical radiological survey data located for the STS Pipeway/Shield Structure. However, jumpers in the valve aisle have been surveyed which would be radiologically similar to the pipeway/shield structure piping. A dose rate measurement of a valve aisle jumper taken in May 1998 was 1,700 mR/hr. Using the 1998 dose rate measurement and the existing STS Valve Aisle scaling factors, the pipeway/shield structure piping could then be modeled and a curie estimate calculated (see Section 7.3).

4.3 Waste Tank Farm HLW Legacy Piping

The HLW legacy piping originates at floor nozzles in the CPC. The lines are between 500 and 700 feet long, are constructed of three-inch Schedule 40 stainless steel pipe, and gravity drain to HLW storage tanks in the Waste Tank Farm. These lines were used for the transfer of all reprocessing wastes to the Waste Tank Farm. PUREX HLW was transferred to Tank 8D-2 via Line 7P-113 and for the transfer of THOREX waste to Tank 8D-4, Line 7P-120 was used. Subsequent to reprocessing, Line 7P-113 has been flushed by the process plant decontamination solutions(10) and other miscellaneous wastes such as cell sump liquid and laboratory wastes that were routinely collected in Tank 7D-2 and sampled in Tank 3D-2 before being transferred to Tank 8D-2. The other HLW Pipeline 7P-112 which serviced Tank 8D-1 was never used as Tank 8D-1 was the spare HLW receiver tank. Using existing analytical data to compute the radioisotopic concentrations of the Tank 7D-2 waste stream and the THOREX waste stream, a curie estimate can be calculated volumetrically for residual wastes remaining in the piping (see Section 7.4).

4.4 M-8 Riser Pump Pit and Associated Piping

The M-8 Pump Pit is 75 inches wide by 60 inches long by 90 inches deep and is fabricated from 1/4-inch stainless steel. The associated supply and return transfer piping plus two spare lines are 2 1/4-inch diameter Schedule 40 304L stainless steel doubly contained in a 200 foot long 20 inch diameter culvert pipe. This system was used to transport the PUREX supernatant, sludge wash and sodium bearing waste water to the STS for treatment.

The interior of the M-8 Riser Pump Pit was last surveyed in November and December 2000 during STS flushing operations. Surveys were taken through existing valve access ports in the pit cover located 65 inches from the top of the pit covers into the pit. Dose rates ranged from 722 mR/hr to 1,244 mR/hr. Using the 2000 dose rate measurements and the existing STS Valve Aisle scaling factors, the pipeway/shield structure piping could then be modeled and a curie estimate calculated (see Section 7.5.1).

There was no historical radiological survey data located for the associated piping of the M-8 Riser. However, jumpers in the valve aisle have been surveyed which would be radiologically similar to this piping. A dose rate measurement of a valve aisle jumper taken in May 1998 was 1,700 mR/hr. Using the 1998 dose rate measurement and the existing STS Valve Aisle scaling factors, the associated piping of the M-8 Riser could then be modeled and a curie estimate calculated (see Section 7.5.2).

4.5 Conclusion

Process knowledge was available that identified the STS Pipeway/Shield Structure, HLW Legacy Piping, and the M-8 Riser pump pit and associated transfer piping as the key curie contributing areas in the balance of the Waste Tank Farm. New dose rate measurements from the HLW Transfer System trench piping and pits are needed to generate MicroShield™ models for these particular areas. Existing Batch 10 analytical data, STS Valve Aisle data, and THOREX waste analytical data assist in the development of the scaling factors. This information allowed for the generation of a conservatively bounded curie estimate for each of the areas (Section 7).

5.0 Sampling Procedures

5.1 HLW Transfer Trench Piping

Surveying of the HLW Transfer Trench piping was conducted in January 2004 in accordance with Work Instruction Package 99456(18) and recorded on Radiation and Contamination Survey Report

123244[19]. Access was gained through two existing conductivity probe penetrations CS-138 and CS-271. Penetration CS-138 is located adjacent to Tank 8D-2 and CS-271 is between the 8Q-1 and 8Q-2 Pits (Appendix A). On January 20, 2004 dose rates were taken at 6-inch intervals from the bottom of the trench cover to the bottom of the trench by lowering the radiation probe through each trench penetration on a cable[18]. The dose rates were taken with a Ludlum 133-6 Geiger-Mueller Detector (Serial Number PR192701) (linear range 4 mR/hr to 10 R/hr) which is range energy compensated and halogen quenched and used for general area monitoring. The Ludlum probe was used in conjunction with a Ludlum Model 2241 Digital Survey Meter (Serial Number 151606), which is typically used with not only Geiger-Mueller detectors but can be used in proportional and scintillation detectors as well. This rate meter directly displays in R/hr. Survey readings were taken and verified in accordance with West Valley Nuclear Services Company (WVNSCO) policies and procedures as identified in the CMP (e.g., WVDP-010, "WVDP Radiological Controls Manual," RC-ADM-19, "Performing Surface Radioactivity Measurements").

5.2 Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

Surveying of Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5 was conducted in December 2004 in accordance with existing procedures. Access was gained through existing pit cover penetrations. On December 30, 2003 dose rates were taken at 1-foot intervals from the top of the pit cover to the bottom of the pit by lowering the radiation probe through each pit penetration on a cable. Dose rate measurements were recorded on Radiation and Contamination Survey Report 122979[20]. The dose rates were taken with a Ludlum 133-6 Geiger-Mueller Detector (Serial Number PR192701) (linear range 4 mR/hr to 10 R/hr) which is range energy compensated and halogen quenched and used for general area monitoring. The Ludlum probe was used in conjunction with a Ludlum Model 2241 Digital Survey Meter (Serial Number 151606), which is typically used with not only Geiger-Mueller detectors but can be used in proportional and scintillation detectors as well. This rate meter directly displays in R/hr. Survey readings were taken and verified in accordance with WVNSCO policies and procedures as identified in the CMP (e.g., WVDP-010, "WVDP Radiological Controls Manual," RC-ADM-19, "Performing Surface Radioactivity Measurements").

5.3 Previous Data Collection Activities

Sections 3.0 and 4.0 provide information on the STS Pipeway/Shield Structure piping, Waste Tank Farm HLW Legacy Piping, and M-8 Riser Pump Pit and associated piping data collection activities implemented previously that resulted in the generation of the preexisting data discussed in Sections 3.0, 4.0, and 7.0.

6.0 Sampling Results/Data Validation

6.1 HLW Transfer Trench Piping

6.1.1 Dose Rate Measurements

Dose rate measurements from the interior of the HLW Transfer Trench were taken on January 20, 2004[21]. The recorded dose rates are shown in Table 5.

The dose rates were taken with a Ludlum 133-4 Geiger-Mueller Detector (Serial Number PR192701) (linear range 4 mR/hr to 10 R/hr) in conjunction with a Ludlum Model 2241 Digital Survey Meter (Serial Number 151606). The calibration of the instrumentation used to take the dose rates of the Transfer Trench was performed in accordance with WVDP-318, "WVDP Radiological Instrumentation Calibration and Maintenance Program Manual," RC-IOC-1, "Administrative Aspects of Radiological Instrument Calibration and

Table 5

HLW Transfer Trench Piping Dose Rate Measurements

Insertion Depth From Bottom of Trench Cover (Inches)	Dose Rate mR/hr	
	Penetration CS-138	Penetration CS-271
0	0.8	3.2
6	1.5	6.5
12	1.8	8.3
18	2.9	8.6
24	2.9	9.7
30		9.8
36		9.0
42		9.6

- See Reference 18.

Maintenance," and applicable instrument specific calibration procedures. The dose rate data was reviewed and validated by WVNSCO. The overall conclusion of the data validation was that the January 20, 2004 dose rates were unconditionally acceptable for their intended use[21].

6.2 Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

6.2.1 Dose Rate Measurements

Dose rate measurements from the interior of Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5 were taken on December 30, 2003[20]. The recorded dose rates are shown in Table 6.

The dose rates were taken with a Ludlum 133-4 Geiger-Mueller Detector (Serial Number PR192701) (linear range 4 mR/hr to 10 R/hr) in conjunction with a Ludlum Model 2241 Digital Survey Meter (Serial Number 151606). The calibration of the instrumentation used to take the dose rates of the pits were performed in accordance with WVDP-318, "WVDP Radiological Instrumentation Calibration and Maintenance Program Manual," RC-IOC-1, "Administrative Aspects of Radiological Instrument Calibration and Maintenance," and applicable instrument specific calibration procedures. The dose rate data was reviewed and validated by WVNSCO. The overall conclusion of the data validation was that the December 30, 2003 dose rates were unconditionally acceptable for their intended use[22].

6.3 Previously Generated Data

Sections 3.0 and 4.0 discuss the previously generated analytical results for the Batch 10 vitrification run data, STS Valve Aisle scaling factors, Tank 3D-2, and the THOREX waste sample data. The analytical data was reviewed by WVNSCO and its acceptability for use is discussed below.

6.3.1 Batch 10 Vitrification Run Data

With the exception of Tc-99 and I-129, the Batch 10 data was validated and unconditionally approved for use. The Tc-99 results were conditionally approved for use due to demonstrated interference from Ru resulting in elevated levels of Tc-99 being reported. The samples were radiochemically separated and the Tc-99 analysis repeated. Two laboratory control samples (two blank spikes) were prepared for the analysis of Tc-99. The laboratory control samples for the Tc-99 exhibited recoveries of 62% and 64%. This could indicate a possible low bias in the sample results of about 40%. However, because the matrix spike sample demonstrated an acceptable recovery, the data was not rejected but was qualified with a "J" flag and should be considered estimated. The reported values were used with no adjustments. The I-129 results were conditionally approved for use due to depressed matrix spike sample recoveries. Per the reports submitted by Pacific Northwest National Laboratory (PNNL)[14, 15], the results reported were corrected for the average spike yield. It was also indicated that the low yield may have been caused by a loss of iodine due to light sensitivity. In recognition of this, the data validator flagged the
I-129 data as estimated ("J"), indicating the results should be considered estimated and conservative.

Table 6

Dose Rate Measurements from Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

Insertion Depth From Top of Pit Cover (Feet)	Dose Rate (mR/hr)			
	Pit 8Q-1	Pit 8Q-2	Pit 8Q-4	Pit 8Q-5
0 (Top)	0.0	10.9	0.0	0.2
2' 2"	11.2	936.0	1.4	2.7
3'	36.2	3,200	2.0	5.1
4'	49.4	5,600	2.5	5.0
5'	53.4	9,800	5.5	6.0
6'	45.2	33,500	5.2	5.5
7'	45.5	15,200	7.8	5.5
8'	51.3	7,700	16.2	N/A

- See Reference 20.

6.3.2 THOREX Waste Sample Data

Information necessary to meet current Level 1 data validation protocol for the THOREX waste sample data obtained from Reference 16 is not available. However, as reported in Reference 16, radiochemical analyses of the Tank 8D-4 THOREX samples were independently performed by both the Westinghouse Atomic Energy Services Division and Oak Ridge National Laboratory. In addition to the analytical work, an ORIGEN computer code run was made using the spent thorium fuel, irradiation, and processing parameters obtained from NFS records. ORIGEN is a computer code that models the radionuclide characterization of spent nuclear fuel based on its physical characteristics such as elemental composition. Good agreement between the analytical results and the ORIGEN run were reported which showed that the data was acceptable for use.

6.3.3 Tank 3D-2 Sample Data

Sample 3D-2 #8 (Sample 02-1765) was collected in December of 2002 and submitted to the Analytical and Process Chemistry (A&PC) Laboratory for analysis. The sample was prepared and analyzed according to approved A&PC Laboratory procedures.

Validation was accomplished by comparing the results of the data packages provided to the requirements imposed by the CMP and the approved validation procedure in place at the time. The details for each package are documented in the applicable validation packages which are maintained in the project files[23]. Please refer to the data validation packages for the criteria utilized in the validation process.

With the exception of I-129, the data was found unconditionally acceptable for its intended use. The I-129 result in Sample 02-1765 was qualified “U”, that is, undetected by the data validator. The data was qualified because the activity demonstrated was less than the Minimum Detectable Activity (MDA) for this sample. This does not impact the usability of the sample result.

6.3.4 STS Valve Aisle Scaling Factors

The following samples were collected in the STS Valve Aisle over a period encompassing December 2000 to February 2002 and submitted to the A&PC Laboratory for analysis: S-007#26 A-F (00-2427), S007#27 A-F (00-2428), R1 (01-1140), R2 (01-1141), R3 (01-1142), S-001 #1 (02-0222), S-1 #2A, #2B (02-0223), S-001 #3A, #3B (02-0224), S-001 #4A, #4B (02-0234), Valve Aisle Sump #1A (02-0307) and Valve Aisle Sump #1B (02-0308).

The samples were prepared and analyzed according to approved A&PC Laboratory procedures.

Validation was accomplished by comparing the results of the data packages provided to the requirements imposed by the applicable sample management plan and the approved validation procedure in place at the time. The details for each package are documented in the applicable validation packages which are maintained in the project files[24]. Please refer to the data validation packages for the criteria utilized in the validation process.

Please note that because the data was not intended solely for the use of the Facility Characterization Project, some of the data validation packages contain an assessment of all data reported and the validation was performed to a standard other than WVDP-403. In these cases, the only data considered for this report is that of those isotopes required by the CMP.

Unless otherwise indicated below, the data was found unconditionally acceptable for its intended use.

The Np-237 results in Samples 00-2427 and 00-2428 were qualified ”J”, that is, estimated, by the data validator. The qualifier was assigned due to spectral interference observed in the Np-237 region of interest. Therefore, the data validator concluded that the Np-237 results for Sample 00-2427 were potentially biased high. Since the use of the reported value generates a more conservative ratio, if it is present at all, the data was utilized in establishing ratios.

The Tc-99 result in Sample 01-1142 was qualified “J” by the data validator. This qualifier was assigned because the uncertainty associated with the sample result was greater than 50% of the activity detected in the sample. Since the use of the reported value generates a more conservative ratio, if it is present at all, the data was utilized in establishing ratios. Please note that there is a typographical error in the data validation report cover sheet indicating the qualifier was assigned to Sample 01-1140. The VAST report and data validation checklist support the qualifier as assigned to Sample 01-1142.

The Cs-137 results in Samples 01-1140, 01-1141, and 01-1142 were qualified “J”, that is estimated, by the data validator. The qualifier was assigned due to contamination in the blank. Therefore, the Cs-137 results were suspected to be biased high, that is, the data validator indicated the Cs-137 may be present in quantities less than that reported. The validation report indicated however, that the activity of Cs-137 in the blank was less than 10% of that found in the samples. Therefore, any impact to the data was minimal. A positive bias of 10% is not considered significant when calculating ratios. Therefore, this data was utilized in establishing ratios.

The Cm-243/244 results in Samples 01-1140, 01-1141, and 01-1142 were qualified “J”, that is estimated, by the data validator. The qualifier was assigned due to depressed recovery of the quality control standard indicating the curium results could be biased low. The data was utilized in establishing ratios because the data validator indicated that even though the results were outside the criteria allowed by the A&PC Laboratory, they were within the limits of 80% - 120% recovery allowed by the WVNSCO data validation procedure.

The U-232, U-233/234, U-235/236, and U-238 results in Samples 01-1140, 01-1141, and 01-1142 were qualified “J”, that is estimated, by the data validator. The qualifier was assigned due to depressed recovery of the quality control standard indicating the uranium results could be biased low. The data was utilized in establishing ratios because the percent recovery was within the limits established by the laboratory.

The following isotopes were qualified “U”, that is, undetected, by the data validator: Tc-99 in Sample 01-1140, I-129 in Samples 02-0307 and 02-0308, U-235/236 and U-238 in Samples 01-1141, 02-0307, and 02-0308, and U-232, U-233/234, U-235/236 and U-238 in Samples 01-1140 and 01-1142. In each case, the data was qualified because the activity demonstrated was less than the MDA for these samples. This does not impact the usability of the sample results.

6.3.5 M-8 Pump Pit

Dose rates surveys were taken of the M-8 Pump Pit in November and December 2000 per the Work Instruction Packages 0001946, 0001985, and 0002260. These surveys were performed per approved radiological protection procedures and the applicable approved work instruction document.

Validation was accomplished by comparing the result of the data packages provided to the requirements imposed by the CMP and WVDP-409, “Verification and Validation of Analytical, Field, and Dose Rate Data.” The details for each package are documented in the applicable validation packages which are maintained in the project files[25].

There were no qualifiers assigned to the data and the data is acceptable for its intended use.

6.3.6 STS Jumper

Dose rate surveys were taken of the STS Valve Aisle Jumper in May 1988 and recorded on Radiation and Contamination Survey Report 060042. These surveys were performed per approved radiological protection procedures.

Validation was accomplished by comparing the result of the data packages provided to the requirements imposed by the CMP and WVDP-409. The details for each package are documented in the applicable validation packages which are maintained in the project files[26].

There were no qualifiers assigned to the data and the data is acceptable for its intended use.

7.0 Data Analysis

Dose-to-curie modeling of the balance of the Waste Tank Farm key curie contributors, with the exception of the HLW legacy piping, was conducted using MicroShield™ software. As identified in the CMP, the modeling was performed by a person trained in the use of the MicroShield™ software and the modeling calculations provided in the referenced appendices have been peer reviewed. The radionuclide inventory for the HLW legacy piping was determined from a conservative residual volume estimate and the radionuclide concentrations.

Dose-to-curie modeling inputs include a dose rate measurement, an isotopic distribution/scaling factors that can be associated with the contamination, and the configuration/dimensions of the particular area. The modeling was performed using a dose rate that was attributed solely to Cs-137. While many radioisotopes emit gamma radiation during decay, their contribution would not significantly change the dose rate due to lower energies and/or low abundance. Per the CMP, the Balance of the Tank Farm MicroShield™ modeling and associated calculated results have been decayed to the reference date of September 30, 2004. Area specific assumptions and modeling results are described below and in the supporting documentation.

7.1 HLW Transfer Trench Piping

On January 20, 2004, dose rates of the HLW Transfer Trench were collected. Dose rate measurements below the pit covers are shown in Table 5. Dose rate measurements were collected inside the trench at two locations along its length. Utilizing the dose rates collected and assuming the dose rate was due entirely to Cs-137, the piping at each survey location was modeled. The piping in the trench was modeled conservatively by using the highest dose rate measured at each survey location and assuming all radiation was from a five foot length of the individual pipeline being modeled. Dose-to-curie modeling calculations and assumptions are provided in Appendix B. Table 7 shows the application of the MicroShield™ modeling results to each pipeline segment to determine the total Cs-137 source term for the HLW Transfer Trench. It was not necessary to decay the Cs-137 source term as the survey data was within one year of September 30, 2004.

The Batch 10 vitrification run scaling factors (Table 8) were then used calculate the HLW Transfer Trench piping radionuclide inventory shown in Table 10. Calculation of the Batch 10 vitrification run scaling factors is provided in Appendix C.

7.2 Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

On December 30, 2003, dose rates of the 8Q-1, 8Q-2, 8Q-4, and 8Q-5 pits were collected. Dose rate measurements below the pit covers are shown in Table 6. Utilizing the highest dose rate measured in each respective pit and assuming the dose rate was due entirely to Cs-137, each pit was modeled. Each pit was treated as a rectangular volume. Because the pits contain a collection of components, jumpers, pipes, and valves, an internal density had to be assigned. Using iron as the source material, a density was calculated for each pit based on the mass of the components in each pit. Dose-to-curie modeling calculations and assumptions are provided in Appendix D. Table 9 shows the component mass, internal density, and the Cs-137 source term determined for each of the pits. It was not necessary to decay the Cs-137 source term as the survey date was within one year of September 30, 2004.

The Batch 10 vitrification run scaling factors (Table 8) were then used to calculate the 8Q-1, 8Q-2, 8Q-4 and 8Q-5 radionuclide inventory shown in Table 10.

7.3 STS Pipeway/ Shield Structure Piping

Dose rate measurements of an STS Valve Aisle Jumper taken in May 1998 was 1,700 mR/hr. Using the 1998 STS Valve Aisle Jumper dose rate measurement and assuming the dose rate was due entirely to Cs-137 uniformly distributed on the internal surfaces, the jumper was modeled.

Dose-to-curie modeling calculations and assumptions are provided in Appendix E. A Cs-137 areal concentration of 138 Fci/cm^2 as of the survey date was determined for the STS Valve Aisle Jumper. When applied to the STS Pipeway/Shield Structure piping surface area estimates, a Cs-137 source term of 414 curies was calculated as shown in Appendix F.

The decay corrected STS Valve Aisle scaling factors shown in Table 11 were then used to calculate the radionuclide inventory of the associated piping shown in Table 10. Calculation of the STS Valve Aisle scaling factors is provided in Appendix G.

7.4 Waste Tank Farm HLW Legacy Piping

7.4.1 Line 7P120

The radionuclide concentrations of the THOREX waste decay corrected to September 30, 2004 were used to calculate the radionuclide inventory of the 3-inch diameter THOREX Transfer Line 7P120. A residual waste volume of 2% of the total line was conservatively estimated based on engineering judgement as explained below. This pipeline is constructed of stainless steel and welded with full-penetration butt weld joints to preclude the accumulation of waste in crud traps. In addition, the piping is sloped at a minimum of 1/16-inch per foot to promote gravity draining of the line to the waste tank. All liquids transferred via Line 7P120 were non-viscous neutoniun fluids. At the low point of the line near the Tank 8D-3/8D-4 vault, there is a short 3-foot branch piping connection with a valve which results in a dead leg. About one gallon of liquid holdup is estimated from the reference Drawing 8A-I-12.

Table 7

Determination of Cs-137 Source Term for the HLW Transfer Trench

Line Segment	Pipeline	Service	Pipe Diameter (Inches)	Total Length (Feet)	Cs-137 Curies per 5 Foot Length from MicroShield™ Modeling (Appendix B)	Total Cs-137 Curies
Vitrification Facility to Tanks 8D-3 and 8D-4	55-PH-3-021	Condensate Return	3	550	0.312	34.3
	5-PH-3-003	Waste Header	3	550	0.312	34.3
Vitrification Facility to Pit 8Q-5	55-PH-2-032	Spare Sludge Transfer	2	110	0.113	2.5
	55-PH-2-033	Sludge Transfer	2	110	0.113	2.5
	55-PH-2-015	Spare Return	2	110	0.113	2.5
	55-PH-2-006	Return	2	110	0.113	2.5
Pit 8Q-5 to Pit 8Q-2	55-PH-2-005	Spare Sludge Transfer	2	213	0.113	4.8
	55-PH-2-004	Sludge Transfer	2	213	0.113	4.8
	55-PH-2-008	Return	2	213	0.113	4.8
Pit 8Q-2 to Pit 8Q-1	55-PH-2-034	THOREX Transfer	2	96	0.278	5.3
	55-PH-2-038	Zeolite Transfer	2	96	0.278	5.3
Pit 8Q-1 to Pit 8Q-4	55-PH-2-018	THOREX Transfer	2	126	0.278	7.0
	55-PH-2-014		2	126	0.278	7.0
Totals				2,623		118

Table 8

Batch 10 Scaling Factors

Project Isotope	Batch 10 Scaling Factors Decayed/Ingrown to September 30, 2004
C-14	2.03e-07
Tc-99	3.51e-05
I-129	1.62e-10
U-232	3.85e-06
U-233	1.49e-06
U-234	5.73e-07
U-235	1.58e-08
Np-237	8.30e-06
U-238	1.41e-07
Pu-238	1.55e-03
Pu-239	4.52e-04
Pu-240	3.21e-04
Pu-241	9.96e-03
Am-241	1.33e-02
Cm-243	8.96e-05
Cm-244	2.10e-03
Cs-137	1.00e+00
Sr-90	9.54e-01

Table 9

Component Mass, Internal Density, and Cs-137 Source Term for 8Q Pits

Pit	Highest Dose Rate Measurement (mR/hr)	Mass of Component (lbs)	Internal Density (g/cm3)	Cs-137 Source Term Curies*
8Q-1	53.4	382	0.0073	0.31
8Q-2	33,500	417	0.0068	221
8Q-4	16.2	927	0.059	0.051
8Q-5	6.0	N/A	3.93	0.753
			Total	222.1

* See Appendix D.

Table 10

Calculation of Radionuclide Inventory for the Balance of the Tank Farm

	Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5	HLW Transfer Trench Piping	HLW Legacy Piping Pipeline 7P113 to Tank 8D-2	HLW Legacy Piping Pipeline 7P120 to Tank 8D-4	STS Pipeway/ Shield Structure	M-8 Riser Pump Pit Piping	Associated Piping (M-8 Pump Pit to STS)
Cs-137 Curies from MicroShield™	2.22e+02 (See Note 1)	1.18e+02 (See Table 7)	N/A	N/A	414.1 (See Appendix F)	3.7	74.5 (See Appendix K)
Cs-137 Curies Aged to 9/30/04	(See Note 2)	(See Note 2)	N/A	N/A	392.1	3.35	64.3
Gallons of Liquid	N/A	N/A	4 (See Appendix I)	7 (See Appendix H)	N/A	N/A	N/A
Project Isotope	**Aged Batch 10 Scaling Factors**		**Aged Tank 3D-2 Analytical Results (VAST 02-1767) (FCi/ml)**	**Aged THOREX Radionuclide Distribution**	**Aged STS Valve Aisle Scaling Factors**		
C-14	2.03e-07	2.03e-07	9.79e-05	1.09e-05	1.31e-06	1.31e-06	1.31e-06
Tc-99	3.51e-05	3.51e-05	1.16e-04	8.75e-03	2.25e-04	2.25e-04	2.25e-04
I-129	1.62e-10	1.62e-10	8.21e-05	1.51e-05	1.04e-09	1.04e-09	1.04e-09
U-232	3.85e-06	3.85e-06	2.02e-05	1.94e-04	9.12e-06	9.12e-06	9.12e-06
U-233	1.49e-06	1.49e-06	8.60e-06	1.76e-04	3.58e-06	3.58e-06	3.58e-06
U-234	5.73e-07	5.73e-07	4.11e-06	1.85e-04	1.72e-06	1.72e-06	1.72e-06
U-235	1.58e-08	1.58e-08	3.30e-08	4.35e-07	7.60e-07	7.60e-07	7.60e-07
Np-237	8.30e-06	8.30e-06	5.17e-06	2.54e-05	8.32e-06	8.32e-06	8.32e-06
U-238	1.41e-07	1.41e-07	4.21e-07	5.98e-09	5.89e-07	5.89e-07	5.89e-07
Pu-238	1.55e-03	1.55e-03	1.35e-03	3.51e-02	1.56e-03	1.56e-03	1.56e-03
Pu-239	4.52e-04	4.52e-04	9.07e-04	1.30e-03	4.86e-04	4.86e-04	4.86e-04
Pu-240	3.21e-04	3.21e-04	6.93e-04	6.80e-04	8.65e-04	8.65e-04	8.65e-04
Pu-241	9.96e-03	9.96e-03	1.23e-02	3.04e-02	9.97e-03	9.97e-03	9.97e-03
Am-241	1.33e-02	1.33e-02	5.79e-03	2.11e-02	1.34e-02	1.34e-02	1.34e-02
Cm-243	8.96e-05	8.96e-05	2.38e-05	1.28e-05	8.96e-05	8.96e-05	8.96e-05
Cm-244	2.10e-03	2.10e-03	6.08e-04	5.83e-04	2.11e-03	2.11e-03	2.11e-03
Cs-137	1.00e+00	1.00e+00	2.23e+00	2.56e+01	1.00e+00	1.00e+00	1.00e+00
Sr-90	9.54e-01	9.54e-01	1.88e-01	1.80e-01	9.58e-01	9.58e-01	9.58e-01

Table 10 (Continued)

Project Isotope	Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5	HLW Transfer Trench Piping	HLW Legacy Piping Pipeline 7P113 to Tank 8D-2	HLW Legacy Piping Pipeline 7P120 to Tank 8D-4	STS Pipeway/ Shield Structure Piping	M-8 Riser Pump Pit	Associated Piping (M-8 Pump Pit to STS)	Totals
Balance of Tank Farm Inventory Decayed/Ingrown to September 30, 2004								
C-14	4.52e-05	2.40e-05	1.48e-06	7.63e-05	5.14e-04	4.39e-06	8.42e-05	7.49e-04
Tc-99	7.79e-03	4.14e-03	1.76e-06	6.13e-02	8.82e-02	7.54e-04	1.45e-02	1.77e-01
I-129	3.59e-08	1.91e-08	1.24e-06	1.06e-04	4.08e-07	3.48e-09	6.69e-08	1.19e-04
U-232	8.56e-04	4.55e-04	3.06e-07	1.36e-03	3.58e-03	3.06e-05	5.86e-04	6.86e-03
U-233	3.32e-04	1.76e-04	1.30e-07	1.23e-03	1.40e-03	1.20e-05	2.30e-04	3.39e-03
U-234	1.27e-04	6.76e-05	6.22e-08	1.30e-03	6.74e-04	5.76e-06	1.11e-04	2.28e-03
U-235	3.50e-06	1.86e-06	5.00e-10	3.05e-06	2.98e-04	2.55e-06	4.89e-05	3.58e-03
Np-237	1.84e-03	9.79e-04	7.83e-08	1.78e-04	3.26e-03	2.79e-05	5.35e-04	6.82e-03
U-238	3.13e-05	1.66e-05	6.37e-09	4.19e-08	2.31e-04	1.97e-06	3.79e-05	3.19e-04
Pu-238	3.45e-01	1.83e-01	2.04e-05	2.46e-01	6.12e-01	5.23e-03	1.00e-01	1.49e+00
Pu-239	1.00e-01	5.34e-02	1.37e-05	9.10e-03	1.91e-01	1.63e-03	3.12e-02	3.86e-01
Pu-240	7.13e-02	3.79e-02	1.05e-05	4.76e-03	3.39e-01	2.90e-03	5.56e-02	5.12e-01
Pu-241	2.21e+00	1.18e+00	1.86e-04	2.13e-01	3.91e+00	3.34e-02	6.41e-01	8.18e+00
Am-241	2.96e+00	1.57e+00	8.77e-05	1.48e-01	5.25e+00	4.49e-02	8.62e-01	1.08e+01
Cm-243	1.99e-02	1.06e-02	3.60e-07	8.96e-05	3.51e-02	3.00e-04	5.76e-03	7.18e-02
Cm-244	4.67e-01	2.48e-01	9.21e-06	4.08e-03	8.27e-01	7.07e-03	1.36e-01	1.69e+00
Cs-137	2.22e+02	1.18e+02	3.38e-02	1.79e+02	3.92e+02	3.35e+00	6.43e+01	9.79e+02
Sr-90	2.12e+02	1.13e+02	2.73e-03	1.74e+02	3.76e+02	3.21e+00	6.16e+01	9.39e+02

Notes:

1 Sum of MicroShield™ modeling results: 8Q-1 (0.31 Ci); 8Q-2 (221 Ci); 8Q-4 (0.051 Ci); 8Q-5 (0.75 Ci).

2 The aging of MicroShield™ results was not required since, per the CMP, the surveys were taken within one year of September 30, 2004.

Table 11

**STS Valve Aisle Scaling Factors
Decayed to September 30, 2004**

Project Isotope	STS Valve Aisle Scaling Factors Decayed to 9/30/04
C-14	1.31e-06
Tc-99	2.25e-04
I-129	1.04e-09
U-232	9.12e-06
U-233	3.58e-06
U-234	1.72e-06
U-235	7.60e-07
Np-237	8.32e-06
U-238	5.89e-07
Pu-238	1.56e-03
Pu-239	4.86e-04
Pu-240	8.65e-04
Pu-241	9.97e-03
Am-241	1.34e-02
Cm-243	8.96e-05
Cm-244	2.11e-03
Cs-137	1.00e+00
Sr-90	9.58e-01

Calculations and assumptions are provided in Appendix H. The calculated radionuclide inventory is also shown in Table 10.

7.4.2 Line 7P113

The radionuclide concentrations of the Tank 3D-2 liquid waste sample decay corrected to September 30, 2004 were used to calculate the radionuclide inventory of the Tank 8D-2 3-inch diameter Waste Transfer Line 7P113. A residual waste volume of 2% of the total line was conservatively estimated based on engineering judgement as explained above. Calculations and assumptions are provided in Appendix I. The calculated radionuclide inventory is shown in Table 10.

7.5 M-8 Riser Pump Pit and Associated Piping

7.5.1 M-8 Riser Pump Pit

The interior dose rate measurements of the M-8 Riser Pump Pit were collected in November and December 2000 during STS flushing operations. Surveys were taken through existing valve access ports in the pit cover located 65 inches from the top of the pit covers into the pit. Dose rates ranged from 722 mR/hr to 1,244 mR/hr. Using the highest dose rate measurement in the pit and assuming the dose rate was due entirely to Cs-137, each pit was modeled. The pits were treated as a rectangular volume. Because the pits contain a collection of components, pipes, and valves, an internal density had to be assigned. A density of 0.21 g/cm^3 was calculated based on the components in the pit and iron was used as a source material.

Dose-to-curie modeling calculations and assumptions are provided in Appendix J. A Cs-137 source term of 3.7 curies was determined for the M-8 Riser Pump Pit.

The decay corrected STS Valve Aisle Scaling Factors shown in Table 11 were then used to calculate the M-8 Riser Pump Pit radionuclide inventory shown in Table 10.

7.5.2 Associated Piping (M-8 Pump Pit to STS)

A dose rate measurement of an STS Valve Aisle jumper taken in May 1998 was 1,700 mR/hr. Using the 1998 valve aisle jumper dose rate measurement and assuming the dose rate was due entirely to Cs-137 uniformly distributed on the internal surfaces, the jumper was modeled.

Dose-to-curie modeling calculations and assumptions are provided in Appendix E. A Cs-137 areal concentration of 138 Fci/cm^2 was determined for the STS valve aisle jumper. When applied to the approximately 900 feet of 2 ½ inch Schedule 40 stainless steel piping which runs between the STS and M-8 Pump Pit, a Cs-137 source term of 74.5 Cs-137 curies was calculated as shown in Appendix K.

The decay corrected STS Valve Aisle scaling factors were then used to calculate the radionuclide inventory of the STS to M-8 Pump Pit piping shown in Table 10.

7.6 Total Curie Estimate

Summing the conservatively estimated curie contributions from each of the key curie contributing areas in the balance of the Waste Tank Farm, the conservative curie estimate for the entire balance of the Waste Tank Farm (decayed/ingrown to September 30, 2004) was calculated (Appendix L) and is shown in Table 12.

The sum total of performance assessment radioisotopes, as depicted in Table 12 (minus Cs-137 and Sr-90), is approximately 23.3 curies.

Table 12

Total Performance Assessment Radionuclides for the Balance of Tank Farm*
(Decayed and Ingrown to September 30, 2004)

Project Isotope	Total Curies
C-14	7.49e-04
Tc-99	1.77e-01
I-129	1.19e-04
U-232	6.86e-03
U-233	3.39e-03
U-234	2.28e-03
U-235	3.58e-03
Np-237	6.82e-03
U-238	3.19e-04
Pu-238	1.49e+00
Pu-239	3.86e-01
Pu-240	5.12e-01
Pu-241	8.18e+00
Am-241	1.08e+01
Cm-243	7.18e-02
Cm-244	1.69e+00
Cs-137*	9.79e+02
Sr-90**	9.40e+02

* The method for choosing the project isotopes is outlined in WVDP-403, "Characterization Management Plan for the Facility Characterization Project" (CMP).

** Cs-137 and Sr-90 are not critical radionuclides for the outcome of the performance assessment but are reported for completeness per WVDP-403.

8.0 Data Limitations

The curie estimates identified above were generated to meet the objectives of the Facility Characterization Project and to facilitate their potential use in the site's performance assessment model. The technical approach, model inputs and assumptions, and the conclusion that the generated curie estimates are conservatively bounding, has been reviewed and validated/approved by the project's Technical Review and Approval Panel (Appendix M) pursuant to the requirements of the CMP.

9.0 References

1. WVDP-403, "Characterization Management Plan for the Facility Characterization Project" (2002).

2. WVNSCO Radiation and Contamination Survey Report 57042, February 21, 1998.

3. Routine Radiation and Contamination Survey Report 1Nw2004 (PVS Building), December 27, 2003.

4. Routine Radiation and Contamination Survey Report 1Aw2004 (Waste Tank Farm), December 27, 2003.

5. WVDP-EIS-017, "High-Level Waste/Vitrification Facility Characterization Study," Revision 1, Page Change 1, September 28, 1995.

6. URS Report, "Conceptual Approach for the Integrated Closure of Waste Management Areas 1 & 3," September 13, 2002.

7. WVNS-IRP-005, "HLW Processing Systems Flushing Operations Run Plan," Revision 4, April 29, 2002.

8. RIR-403-007, "Supernatant Treatment System (STS) Valve Aisle Radioisotope Inventory Report,"

9. Radiation and Contamination Survey Report 060042 for STS Valve Aisle Operating Aisle, May 8, 1998.

10. Reithmiller, G. Ellis, "History of Decontamination," Nuclear Fuel Services, 1981.

11. Work Order STS0001946, "Perform Flush of STS Flush Path #4," October 23, 2000.

12. Work Order STS0001985, "Perform Flush of STS Flush Path #2," October 30, 2000.

13. Work Order STS0002260, "Perform Flush of STS Flush Path #3," December 7, 2000.

14. Pacific Northwest National Laboratory Report WVSP 00-28, "WVDP Radioactive Waste Characterization Letter Report - Part 1: Physical, Chemical, and Radiochemical Analytical Data," March 2000.

15. Pacific Northwest National Laboratory Report WVSP 01-07, "WVDP Radioactive Waste Characterization Letter Report - Part 3: Iodine-129 Measurement by Low Energy Photon Spectrometry (LEPS)," November 2000.

16. Topical Report DOE/NE/44139-14 "High-Level Waste Characterization at West Valley, " June 2, 1986.

17. URS Memorandum, Wolniewicz, J., "Nuclide Ratios for Use in the Facility Characterization Project," Memorandum to L. Michalczak, July 29, 2002.

18. Work Instruction Package 99456, “Radiation Readings in SMS Trench to Support Facility Characterization,” January 2004.

19. Radiation and Contamination Survey Report 123244, January 20, 2004.

20. Radiation and Contamination Survey Report 122979, December 30, 2003.

21. Data Validation Package 2004-012 - HLW Transfer Trench Dose Rate Surveys, January 28, 2004.

22. Data Validation Package 2004-002 - Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5 Dose Rate Surveys, January 8, 2004.

23. Data Validation Package 2003-32 - Laboratory Report 03-1765, Tank 3D-2 Sample, March 17, 2003.

24. Data Validation for S007 #26 A - F, Laboratory Report 00-2427; Data Validation for S007 #27 A - F, Laboratory Report 00-2428; Data Validation for R1, R2, and R3, Laboratory Report 01-1140, 01-1141, and 01-1142; Data Validation for S-001 #1, S-001 #2AB, S-001 #AB, and S-001 #4AB, Laboratory Reports 02-0222, 02-0223, 02-0224, and 02-0234; Data Validation for Sump #1A and Sump #1B, Laboratory Reports 02-0307 and 02-0308.

25. WVNSCO Data Validation Package 2004-003 - M-8 Pit and STS Valve Aisle Dose Rate Surveys, January 26, 2004.

26. WVNSCO Data Validation Packages 2004-014 - STS Valve Aisle Jumper Dose Rate Surveys, January 29, 2004.

Appendix A

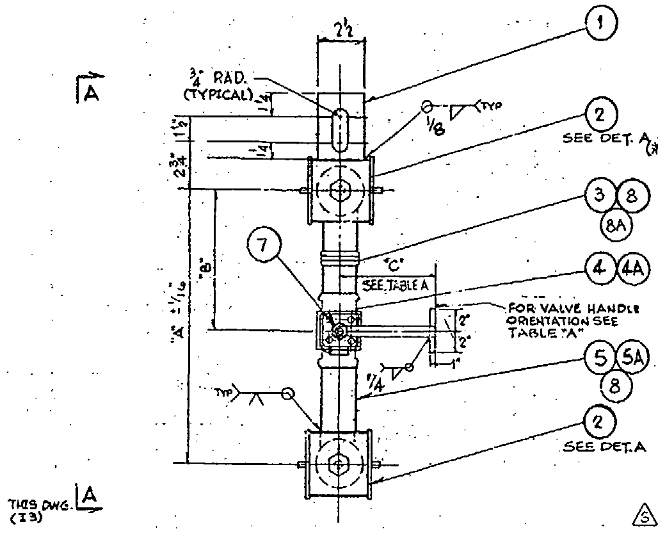
Drawings 900D-1079, 900D-1170, 900D-1305 Sheets 1 & 10, 900D-2826, 903D-055 - 903D-059, 904D-060 Sheets 1-5, 904D-125, 904D-126, 904D-127, 904D-128, 904D-140 - 904D-144, 904D-146, 8A-L-1, 8A-L-10, 8A-L-12, 8A-L-13, 8B-M-591, 8B-M-4, and 900D-1175

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

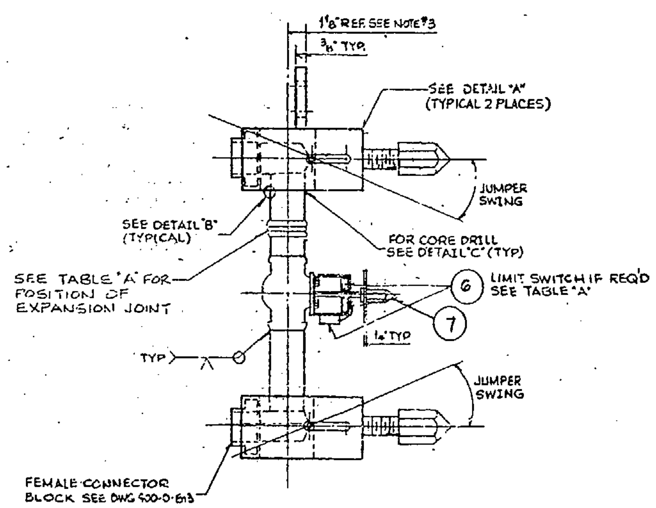
REV NO	DATE	REVISION	DR	CH	APPROVED
B	11-25-85		GMG	RAM	
GENERAL REVISION					
0	12-3-85	ER 558			
1	8-1-86	ECN 876	JAW		
2	5-19-87	REV'D. PER ECN 1640	GJN		
3	2/9/89	REVISED PER ECN 2748	EHB		
4	3/28/91	PER ECN 4222	JLH	HAB	SW
5	11/8/91	REV PER ECN 4679	WCK	HAB	

TABLE A

EXPANSION JOINT E.T.E. MAX.	POSITION OF EXP. JOINT	JUMPER NUMBER	'A'	'B'	'C'	JUMPER LINE №	VALVE SIZE VALVE №	VALVE HANDLE ORIENTATION	'D'	LIMIT SWITCH	GRID COORDINATE	"E"
4¾"	TOP	J10	18"	10"	6"	1½"-013	1½" FV402B	LEFT	1.610ID	YES	G5135, J5135	1.610ID
6"	BOTTOM	J12	22½"	11¼	6"	1½"-062	1½" FV403	RIGHT	1.610ID	YES	G15.5, J5-15.5	1.610ID
4¾"	TOP	J13	18"	10"	6"	1½"-005	1½" FV401	LEFT	1.610ID	YES	J17, L17	1.610ID
4¾"	TOP	J17	18"	10"	6"	1½"-012	1½" FV302B	LEFT	1.610ID	YES	G5.20, J5.20	1.610ID
6"	BOTTOM	J19	22½"	11¼	6"	1½"-061	1½" FV303	RIGHT	1.610ID	YES	G22, J5.22	1.610ID
4¾"	TOP	J20	18"	10"	6"	1½"-009	1½" FV301	LEFT	1.610ID	YES	J23.5, L23.5	1.610ID
4¾"	TOP	J24	18"	10"	6"	1½"-011	1½" FV202B	LEFT	1.610ID	YES	G5.26.5, J5.26.5	1.610ID
6"	BOTTOM	J26	22½"	11¼"	6"	1½"-060	1½" FV203	RIGHT	1.610ID	YES	G28.5, J5.28.5	1.610ID
4¾"	TOP	J27	18"	10"	6"	1½"-008	1½" FV201	LEFT	1.610ID	YES	J30, L30	1.610ID
4¾"	TOP	J31	18"	10"	6"	1½"-010	1½" FV102B	LEFT	1.610ID	YES	G5.33, J5.33	1.610ID
6"	BOTTOM	J33	22½"	11¼"	6"	1½"-049	1½" FV103	RIGHT	1.610ID	YES	G35, J5.35	1.610ID
4¾"	TOP	J34	18"	10"	6"	1½"-007	1½" FV101	LEFT	1.610ID	YES	J36.5, L36.5	1.610ID
4¾"	BOTTOM	J49	18"	10"	6"	1½"-010	1½" FV029	RIGHT	1.610ID	YES	D12, F12	1.610ID
4¾"	TOP	J50	18"	10"	6"	1½"-131	1½" FV092	RIGHT	1.610ID	YES	D13, F13	1.610ID
4¾"	TOP	J52	18"	10"	6"	1½"-053	1½" FV407	LEFT	1.610ID	YES	D15, F15	1.610ID
4¾"	TOP	J57	18"	10"	6"	1½"-052	1½" FV307	LEFT	1.610ID	YES	D20, F20	1.610ID
4¾"	TOP	J60	18"	10"	6"	1½"-042	1½" FV066	LEFT	1.610ID	YES	D23, F23	1.610ID
4¾"	BOTTOM	J61	18"	10"	6"	1½"-075	1½"-H083	RIGHT	1.610ID	NO	D24, F24	1.610ID
4¾"	BOTTOM	J62	18"	10"	6"	1½"-067	1½"-H084	LEFT	1.610ID	NO	D26, F26	1.610ID
4¾"	TOP	J63	18"	10"	6"	1½"-051	1½"-FV207	LEFT	1.610ID	YES	D27, F27	1.610ID
4¾"	TOP	J58	18"	10"	6"	1½"-050	1½"-FV107	RIGHT	1.610ID	YES	D32, F32	1.610ID
4¾"	TOP	J74	18"	9½"	6"	1"-047	1"-FV078	LEFT	1.049ID	YES	C30, E38	1.049ID
4¾"	BOTTOM	J75	18"	10"	6"	1½"-001	1½-FV077	LEFT	1.610ID	NO	C39, E39	1.610ID



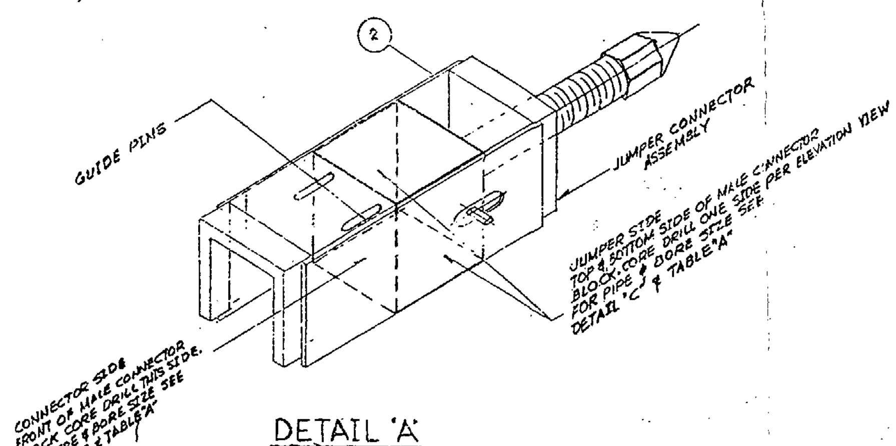
VERTICAL JUMPER (MANUAL VALVE)
ELEVATION



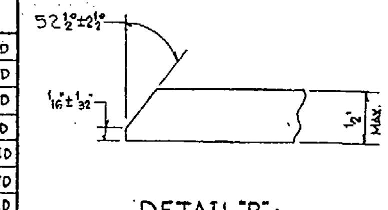
SECTION A-A

BILL OF MATERIAL

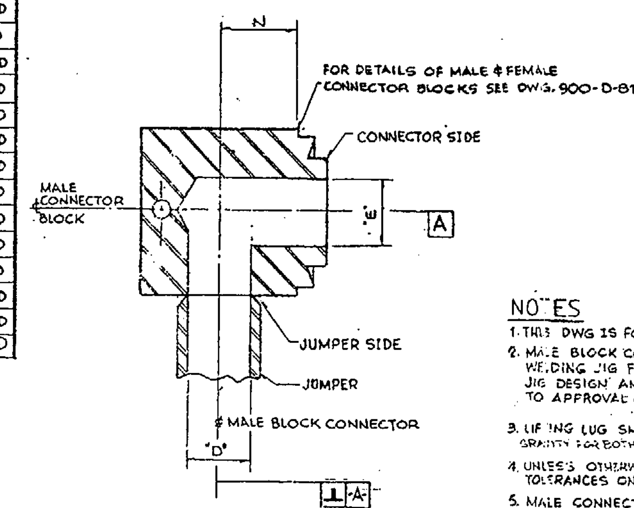
ITEM №	DESCRIPTION	QUANITY
1	LIFTING LUG 4"x2½"x⅜" PL ASTM 240 TP304L STN STL	22
2	CONNECTOR ASSEMBLY (DETAIL "A")	44
3	1½" ⌀ PIPE ASTM A312 TP304L STN. STL SCH 40S (B.B.E.)	7
4	1½" ⌀ ITT GRINNELL BALL VALVE B.W. STN. STL. END TO END 7.50"	21
4A	1" ⌀ ITT GRINNELL BALL VALVE B.W. STN. STL. END TO END 6.50"	1
5	1½" ⌀ PIPE ASTM A312 TP304L STN. STL SCH 40S (B.B.E.)	14
5A	1" ⌀ PIPE ASTM A312 TP304L STN STL. SCH 40S (B.B.E)	1
6	LIMIT SWITCH / ELECT. TERMINATION CONN SUPPLIED W/ VALVE	19
7	STEM DRIVE HEX NUT SUPPLIED WITH VALVE	22
8	1½"-150# EXPANSION JOINT STN STL WITH B.W. ENDS	21
8A	1"-150# EXPANSION JOINT STN STL WITH B.W. ENDS	1



DETAIL 'A'
CONNECTOR ASSEMBLY



DETAIL "B" (OPEN ROOT)
WELD END PREPARATION



DETAIL "C"
FOR ORIENTATION OF MALE BLOCK CONNECTOR SEE VERTICAL JUMPER ELEVATION

(*) JUMPER #27 (J30, L30), WAS REPLACED BY JUMPER #J49

NOTES
1. THIS DWG IS FOR JUMPERS LISTED IN TABLE "A" ONLY
2. MALE BLOCK CONNECTOR AND PIPE SHALL BE CLAMPED IN WELDING JIG FOR ASSEMBLY TO INSURE PERPENDICULARITY; JIG DESIGN AND FABRICATION TOLERANCES SHALL BE SUBJECT TO APPROVAL ON INSPECTION.
3. LIFTING LUG SHALL BE WELDED AS CLOSE TO THE CENTER OF GRAVITY FOR BOTH X & Y PLANE OF JUMPER ASSEMBLY.
4. UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS: ±⅛" ⊥: ± 0°-30'.
5. MALE CONNECTOR AND CLAMP PLATE SHALL BE FIELD ASSEMBLED USING A SPIRAL-PIN. JUMPER SWING TO BE DETERMINED IN FIELD.
6. REMOVE ALL BURRS AND BREAK ALL SHARP CORNERS.
7. DIMENSIONS SHOWN IS FOR THE EQUIPMENT SPECIFIED FABRICATOR SHALL VERIFY ALL DIMENSIONS FOR THE EQUIPMENT PURCHASED.
8. ALL MATERIAL, EQUIP. SHALL BE AS SPECIFIED OR APPROVED EQUAL.
9. ALL WELDING AND VISUAL INSPECTION SHALL CONFORM TO THE REQUIREMENTS OF ANSI B31.3. THE MAX. INTERPASS FOR WELDING STN. STL. SHALL BE 350°F.

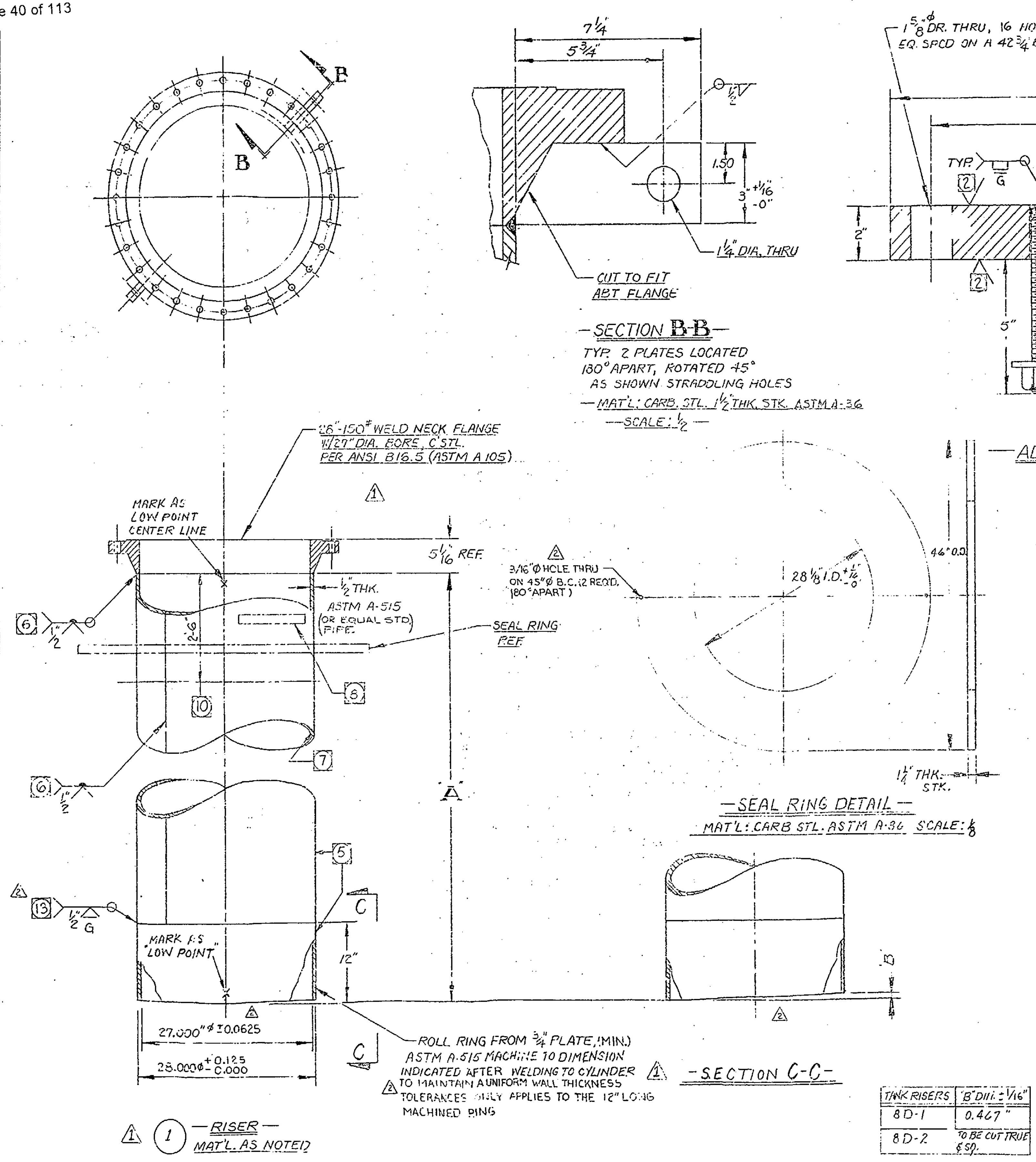
REFERENCE DRAWINGS
1. VALVE AISLE FRONT FACE JUMPER LOCATION ELEVATION A-A — 900D-1080, SH. 2
2. WVNS JUMPER DETAILS — DWG 900-D-813
3. ISA DATA SHEETS FOR VALVES — WVNS-IS-097
4. ITT GRINNELL MANUAL BALL VLV DETAILS — 900D-1089
5. STS LEAK TEST VALVE FOR VERTICAL JUMPERS — 900D-1441

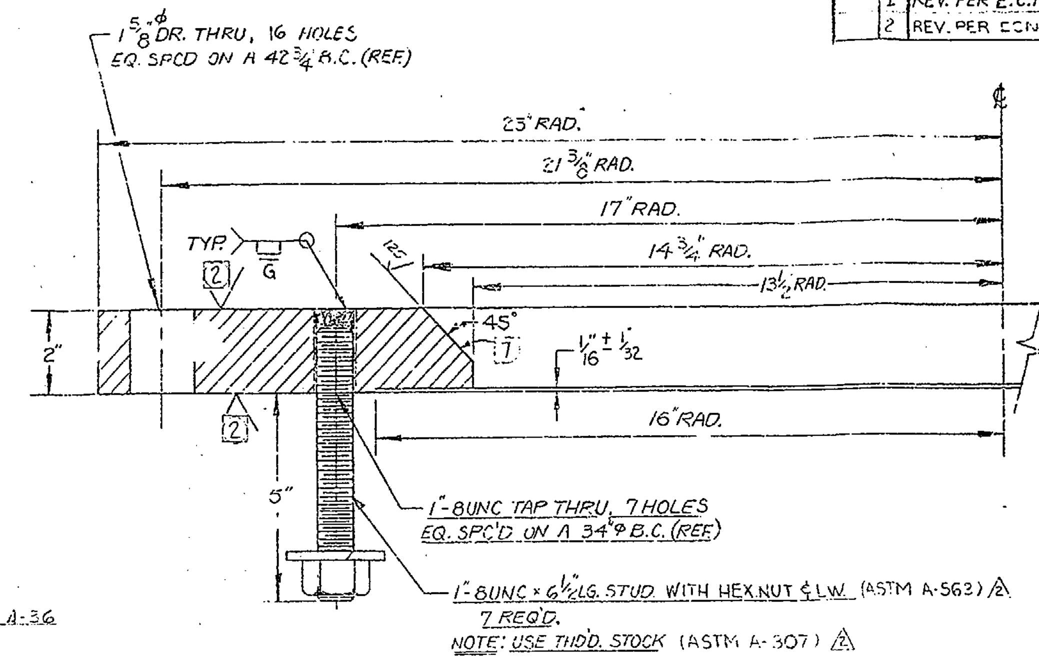
FOR DRAWING INDEX SEE DRAWING NO. ______

APPR'D WVNS CO. 12/2/85	EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2388 TASK ORDER 013 FOR
PROJECT MGR 10/11/85	WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
ENGINEER SUPV W. Santee 10/10/85	
LEAD DISC. ENGR. 10/10/85	WEST VALLEY DEMONSTRATION PROJECT
DESIGN R. J. LEWIC 10/10/85	FRONT FACE VERTICAL JUMPER
CHECKED 10/10/85	MANUAL VALVE ASSEMBLY
DRAWN T. J. PIAZZA DATE 10/10/85	
DE-AC07-81NE44139 PROJECT NO.	SIZE D INDEX CODE NUMBER AREA DR. TYP CL ORIG — DRAWING NO. 900D-1079 SHT. 1 — REV. 5
15-CHV-0227E SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	SCALE NONE — SPEC. CODES — A/E SHEET NO. SK-M-211 SH 1 B

900D-1170

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	0	E.L. 370		
	1	REV. PER E.C.N. No. 685 & 700	5-15-86	KBH
	2	REV. PER ECN 742-796 & 853	6/27/86	





ADAPTER PLATE FOR 28" O.D. RISER
MAT'L: CARB. STL. ASTM A-36
SCALE: 1/2

RISER DATA		
TANK NUMBER	RISER NUMBER	DIM. "A" ±1/4
8D-1	M-2	17'-0 3/4"
8D-1	M-5	17'-0 3/4"
8D-1	M-6	17'-9"
8D-1	M-7	17'-4"
8D-1	M-8	6'-11"
8D-2	M-2	17'-10"
8D-2	M-3	17'-10"
8D-2	M-4	17'-9 1/4"
8D-2	M-5	17'-8 1/2"
8D-2	M-6	17'-8 1/2"
8D-2	M-7	17'-9 1/4"
8D-2	M-8	8'-1 1/2"
8D-2	M-9	7'-1"

TANK RISERS	"B" DIM. ±1/16"
8D-1	0.467"
8D-2	TO BE CUT TRUE & SQ.

GENERAL NOTES: (UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONING AND TOLERANCING PER ANSI Y 14.5 TOLERANCES: .XX ± .01, ANGULAR ±1°, FRACTIONAL ± 1/8" UNLESS NOTED.
2. ALL MACHINE SURFACES 250 IN ACCORDANCE WITH ANSI B46.1 (LATEST REVISION).
3. BREAK ALL SHARP EDGES, REMOVE ALL BURRS.
4. MATERIAL SHALL BE AS SPECIFIED ANY MATERIAL SUBSTITUTION REQUIRES WRITTEN APPROVAL OF WVNS.
5. ASTM-A-515 PLATE TO BE ROLLED ACCORDING TO ASTM-A-671, CLASS 10 SPECIFICATIONS.
6. LONGITUDINAL AND CIRCUMFERENTIAL BUTT JOINTS SHALL BE WELDED AND VISUALLY INSPECTED (VT) IN ACCORDANCE WITH AWS D1.1, STRUCTURAL WELDING CODE STEEL, SECTION 10.17.1, OR ASME SECT. IX ARTICLE II. IN ADDITION, A VACUUM BOX TEST, OR PRESS. TEST PER ASME BOILER AND PRESSURE VESSEL CODE, SECTION V SHALL BE CONDUCTED ON THE RISER WELDS AT TIME OF MANUFACTURE.
7. APPLY AMERCOAT 90 EPOXY, AMERON INC. TO INTERIOR SURFACE PER MANUFACTURER'S INSTRUCTIONS. COAT TO AN AVERAGE THICKNESS OF 8-10 MILS. DO NOT APPLY TO MACHINED AREA.
8. MARK WHERE NOTED WITH TANK NO. AND RISER NO. USING 1 IN. STENCIL AND WHITE PAINT.
9. WELD METAL TO JOIN CARBON STEEL TO CARBON STEEL SHALL BE AWS-A5.1E70XX, OR PER ASME, SECTION IX ARTICLE IV, QW-442
10. SEAL RING SHALL BE SHOP FIT AROUND TOP 2.5' LENGTH OF RISER PRIOR TO WELDING THE WELD NECK FLANGE. GRIND RISER WHERE NECESSARY FOR FIT. WIRE RING TO LIFTING EARS.
11. PROVIDE INTERNAL STEEL SUPPORT FOR BOTTOM LENGTH TO PROTECT DIA. TOLERANCE DURING SHIPMENT AND STORAGE. NO WELDING PERMITTED.
12. FOR GENERAL NOTES - SEE DWG. 903D-111
13. BACK-STEP WELDING METHOD IS RECOMENDED FOR MACHINED RING TO CYLINDER WELD TO MINIMIZE INTERNAL STRESS IN 12" LONG RING.

QTY. REQD.	SYM	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT. NO.	PART OR IDENTIFYING NO.	MATERIAL	SPECIFICATION	ZONE

PARTS LIST

INDEX CODE NUMBER			
AREA	DWG. TYPE	CL.	ORIG.
800	78	55	01

SPEC CODE

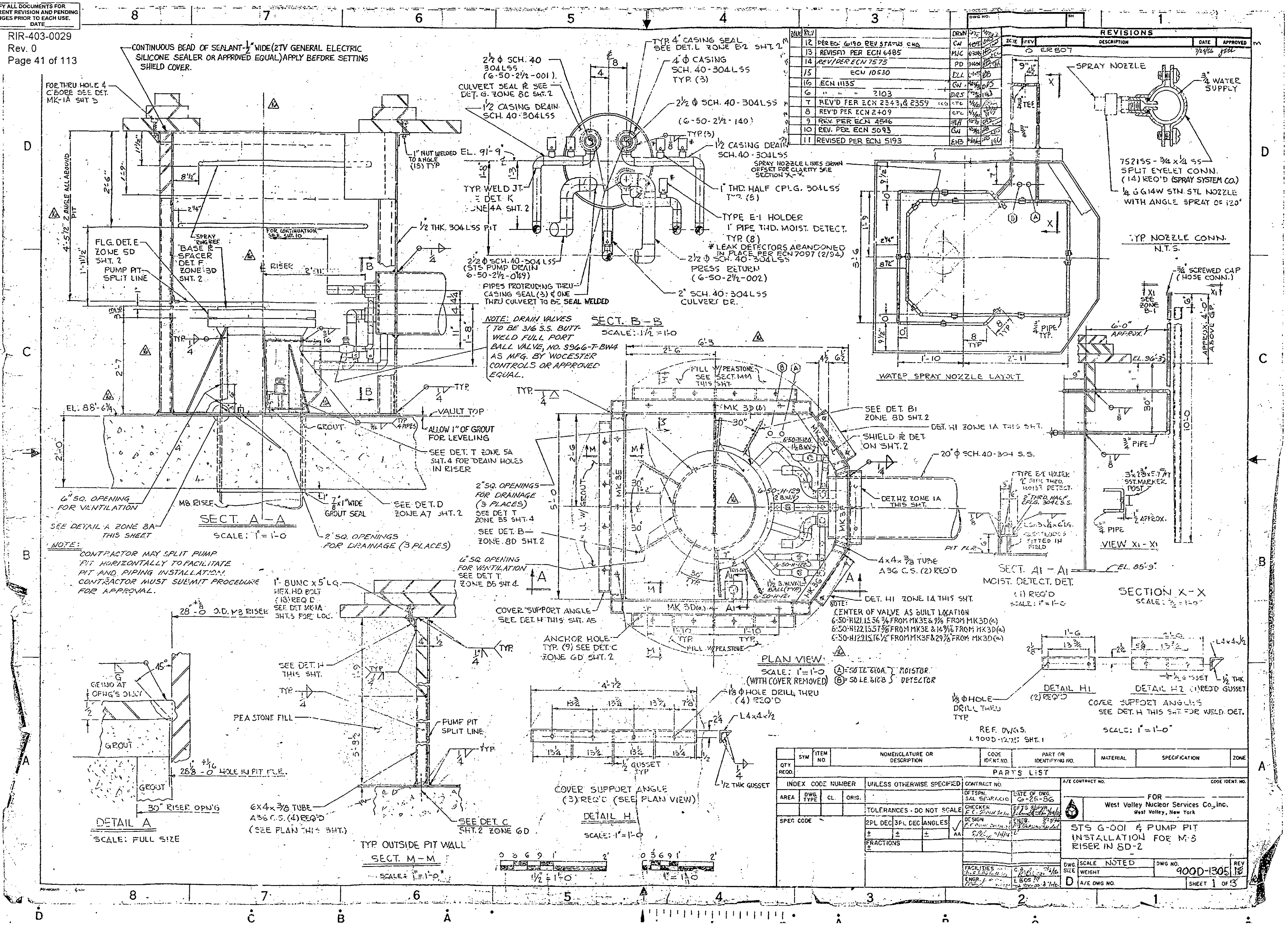
UNLESS OTHERWISE SPECIFIED
TOLERANCES - DO NOT SCALE
2PL DEC ± .01 | 3PL DEC ±.0625 | ANGLES ±
FRACTIONS 1/8

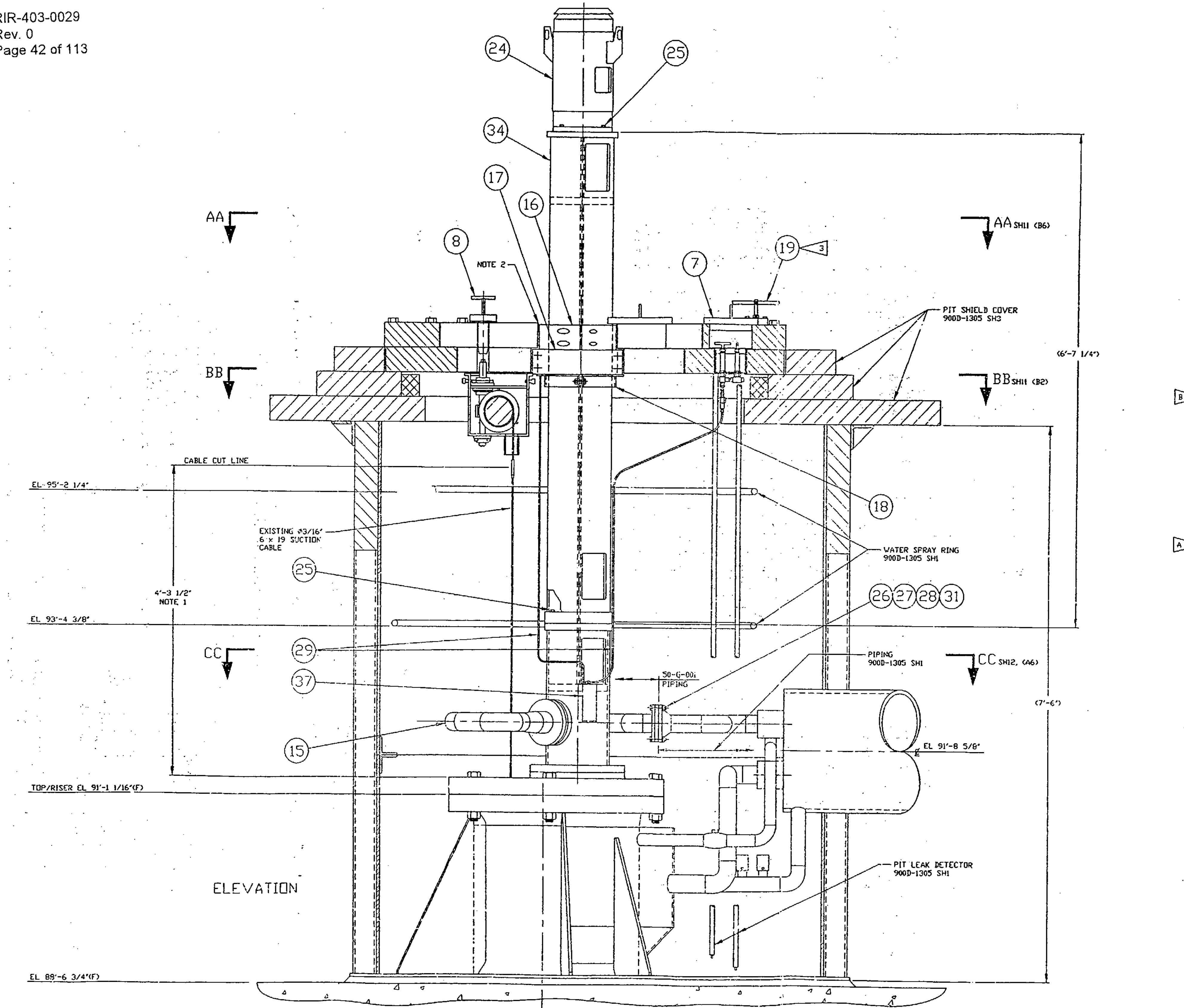
CONTRACT NO
DFTR C. GERWITZ — DATE OF DWG. 2-25-86
CHECKER
DESIGN
ENGR.
FACILITIES N/A
Q.A.

A/E CONTRACT NO — CODE IDENT NO.
FOR West Valley Nuclear Services Co., Inc.
West Valley, New York

HLW-TANK FARM 8D-1 & -2
MOBILIZATION PUMP RISER DETAILS

DWG. SIZE D | SCALE NOTED | DWG NO. 900D-1170 | REV 2
WEIGHT
A/E DWG NO | SHEET 1 OF 1


REVISIONS
0 ER807 7/24/86
12 PER ECN 6190 REV STATUS CHG
13 REVISED PER ECN 6485
14 REV/PER ECN 7575
15 ECN 10530
16 ECN 11135
6 " " 3103
7 REV'D PER ECN 2343 & 2359
8 REV'D PER ECN 2409
9 REV. PER ECN 4546
10 REV. PER ECN 5093
11 REVISED PER ECN 5193
SECT. A-A
SCALE: 1" = 1'-0
SECT. B-B
SCALE: 1½" = 1'-0
PLAN VIEW
SCALE: 1" = 1'-0
(WITH COVER REMOVED)
WATER SPRAY NOZZLE LAYOUT
TYP NOZZLE CONN.
N.T.S.
VIEW X1 - X1
SECTION X-X
SECT. A1 - A1
MOIST. DETECT. DET.
(1) REQ'D
DETAIL A
SCALE: FULL SIZE
TYP OUTSIDE PIT WALL
SECT. M-M
SCALE: 1½" = 1'-0"
DETAIL H
SCALE: 1" = 1'-0
DETAIL H1
(2) REQ'D
DETAIL H2 (1) REQ'D
COVER SUPPORT ANGLES
SEE DET. H THIS SHT. FOR WELD DET.
SCALE: 1" = 1'-0"
NOTE: DRAIN VALVES TO BE 3/16 S.S. BUTT-WELD FULL PORT BALL VALVE, NO. S966-T-BW4 AS MFG. BY WORCESTER CONTROLS OR APPROVED EQUAL.
NOTE: CONTRACTOR MAY SPLIT PUMP PIT HORIZONTALLY TO FACILITATE PIT AND PIPING INSTALLATION. CONTRACTOR MUST SUBMIT PROCEDURE FOR APPROVAL.
CONTINUOUS BEAD OF SEALANT-½" WIDE (2TV GENERAL ELECTRIC SILICONE SEALER OR APPROVED EQUAL) APPLY BEFORE SETTING SHIELD COVER.
PARTS LIST
FOR West Valley Nuclear Services Co., Inc. West Valley, New York
STS G-001 & PUMP PIT INSTALLATION FOR M-8 RISER IN 8D-2
SCALE NOTED
DWG NO. 900D-1305
SHEET 1 OF 3
REF. DWGS. 900D-1305 SHT. 1



NOTES:

1 A) AFTER LIFTING SUCTION CABLE TO HIGHEST POSITION, CLAMP-OFF AT TOP OF RISER, TO HOLD

B) CUT CABLE AT 4'-3 1/2" ABOVE EXISTING RISER BLIND FLANGE

C) CONNECT NEW CABLE TO EXISTING BY CRIMPING TWICE AT 90° APART

2 INSERT 2 ROWS OF 1/2" SILICON CAULKING ROPE AROUND SHIELD PLATES AND RTV TO SEAL

3 RTV SEAL AROUND VALVE OPERATOR FLANGES

4 THIS ASSEMBLY IS FOR 50-G-001 WITH FIELD INSTALLED MOTOR EXTENSION

5 FOR FURTHER INFORMATION, SEE SHEET 1

ADDRESSES:

A RELIANCE ELECTRIC
CLEVELAND, OH 44117

B CAJON COMPANY
9760 SHEPARD RD
MACEDONIA, OH 44056

REFERENCE DRAWINGS:

900D-558 TANK 8D-2 ROOF FRAMING & BOTTOM GRIDWORK, RISER LOCATION
900D-1170 WTF 8D-1 & 2 MOBIL PUMP RISER DETAILS
900D-1275 STS UTILITY & PROCESS LINES GENERAL ARRANGEMENT
900D-5626 WTF G-001 PUMP ROTATION WINCH ASSEMBLY
900D-5629 WTF G-001 PUMP ROTATION DETAILS
900D-5630 WTF G-001 PUMP ROTATION PIPING DETAILS
900D-5631 WTF G-001 PUMP ROTATION COVER ASSEMBLY
900D-5632 WTF G-001 PUMP ROTATION VALVE EXTENSIONS
900D-5636 WTF G-001 PUMP ROTATION COVER ASSEMBLY & DETAILS

QTY REQD G02	QTY REQD G01	ITEM NO.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO	MAT'L OR SPEC
	1	37	GREASE CUP	900D-1305H37 SHEET 13	SST
1		36	MOTOR EXTENSION	900D-1305H36 SHEET 13	304L
1		35	FLANGE	900D-1305H35 SHEET 13	304L
	1	34	MOTOR EXTENSION	GOULDS D5566	
	1	33	SHIELD BAR, PLAIN	900D-5631H24	
	1	32	B WIRE ROPE GUIDE, MODIFIED REDUCING ADAPTER, PART #SS-8-RA-6	900D-1305H32 SHEET 13	
	1	31	SPACER	900D-1305H31 SHEET 13	304
	1	30	VALVE BLANK-OFF FLANGE	900D-1305G02 SHEET 13	
	2	29	GREASE FLUSH LINE, 1/4"OD (.035W) x LG A/R		304
	12	28	FLAT WASHER, 1/2", TYPE B, REG		18-8
	12	27	HEX NUT, 1/2-13UNC		18-8
	12	26	HEX HD CAP SCREW, 1/2-13UNC x 2" LG		18-8
	8	25	HEX HD CAP SCREW, 3/8-16UNC x 1 1/2" LG		18-8
	1	24	A MOTOR, 5 HP, 184T, C-FACE MOUNTING TEFC 460V, Ø3, LP FRAME		
		23	VALVE EXTENSION SCREW HEX HD MACH SCR, 3/8-16UNC x 1 1/2" LG		
	1	22	VALVE EXTENSION #4	900D-5632G04	
	1	21	VALVE EXTENSION #3	900D-5632G03	
	1	20	VALVE EXTENSION #2	900D-5 [illegible]G02	
	1	19	VALVE EXTENSION #1	900D-5632G01	
	1	18	PUMP SLEEVE	900D-5636G04	
	1	17	LOWER PUMP SLEEVE	900D-5636G02	
	1	16	UPPER PUMP SLEEVE	900D-5636G01	
	1	15	PIPING ASSEMBLY	900D-5630G01	
	1	14	WINCH ASSEMBLY	900D-5626G01	
	1	13	SHIELD BAR, SLOTTED	900D-5631H26	
		12	FLAT WASHER, 1/2, TYPE B, REG	900D-5626H29	
		11	HEX HD CAP SCREW, 1/2-13UNC x 2 1/4" LG	900D-5626H28	
	2	10	WINCH BOX HOLD DOWN BRACKET	900D-5629H04	
	1	9	WINCH BRACKET ASSEMBLY	900D-5629G01	
	1	8	SHIELD PLUG	900D-5631G09	
	1	7	PIT COVER ASSEMBLY #7	900D-5636G03	
	1	6	PIT COVER ASSEMBLY #6	900D-5631G08	
	1	5	PIT COVER ASSEMBLY #5	900D-5631G07	
	1	4	PIT COVER ASSEMBLY #4	900D-5631G04	
	1	3	PIT COVER ASSEMBLY #3	900D-5631G03	
	1	2	PIT COVER ASSEMBLY #2	900D-5631G02	
	1	1	PIT COVER ASSEMBLY #1	900D-5631G01	

PARTS LIST

UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES	DRAFTER D. PORTER	DATE 04/21/98	A/E CONTRACT NO. / CODE IDENT NO.
MACHINED SURFACES FLATNESS .002 FINISH 125	CHECKER D. SHAFFER	DATE 06/05/98	FOR WEST VALLEY NUCLEAR SERVICES CO. INC. WEST VALLEY N.Y.
TOLERANCES FRACTION ±1/16 2 PLACE ±.03 ANGLE ±0°30' 3 PLACE ±.005	ENGINEER H. JAMES	DATE 06/05/98	
FILE NAME 1305D010			
PLOT SCALE 1=8.00			
D SPEC NO. 3302			
NEXT ASSEMBLY			

WTF
50-G-001 PUMP 8D-2 M8 RISER
PUMP PIT ELEVATION

DATABASE LINKED DRAWING	DWG SIZE	SCALE NONE	DWG NO.	REV
SEE ENGINEERING RELEASE FORM (ER) FOR DRAWING APPROVAL SIGNATURES.	D	WEIGHT	900D-1305	0
		A/E DWG NO.	SHEET 10 OF	

REV	DESCRIPTION	APPR'D
0	CREATED PER ER4167 06/05/98	JRH

REVISIONS

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

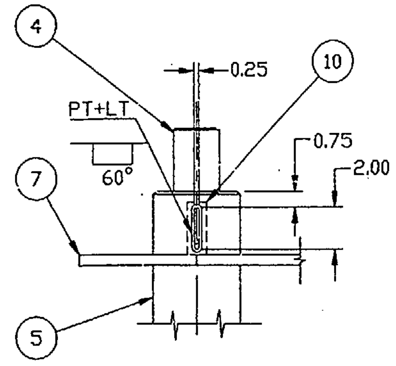
Mon Jun 08 07:39:16 1998 DRS

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

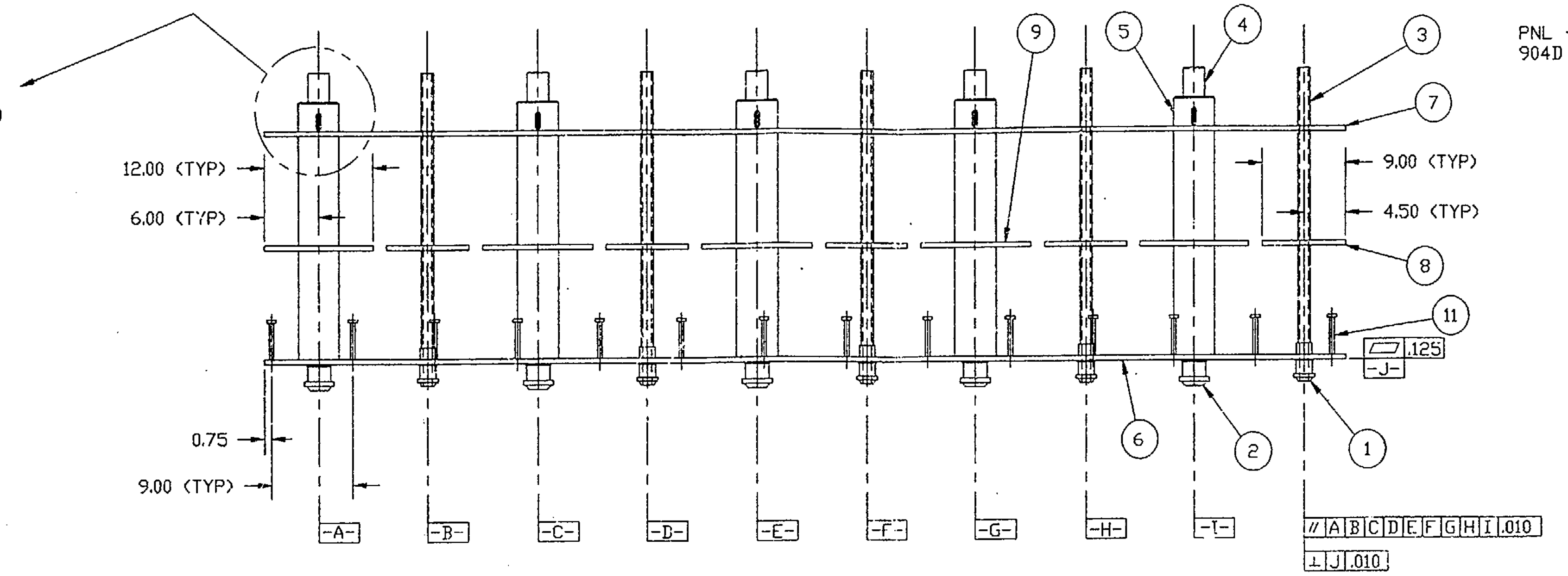
DWG NO 900D-2826 SH 1

REFERENCE DRAWINGS:

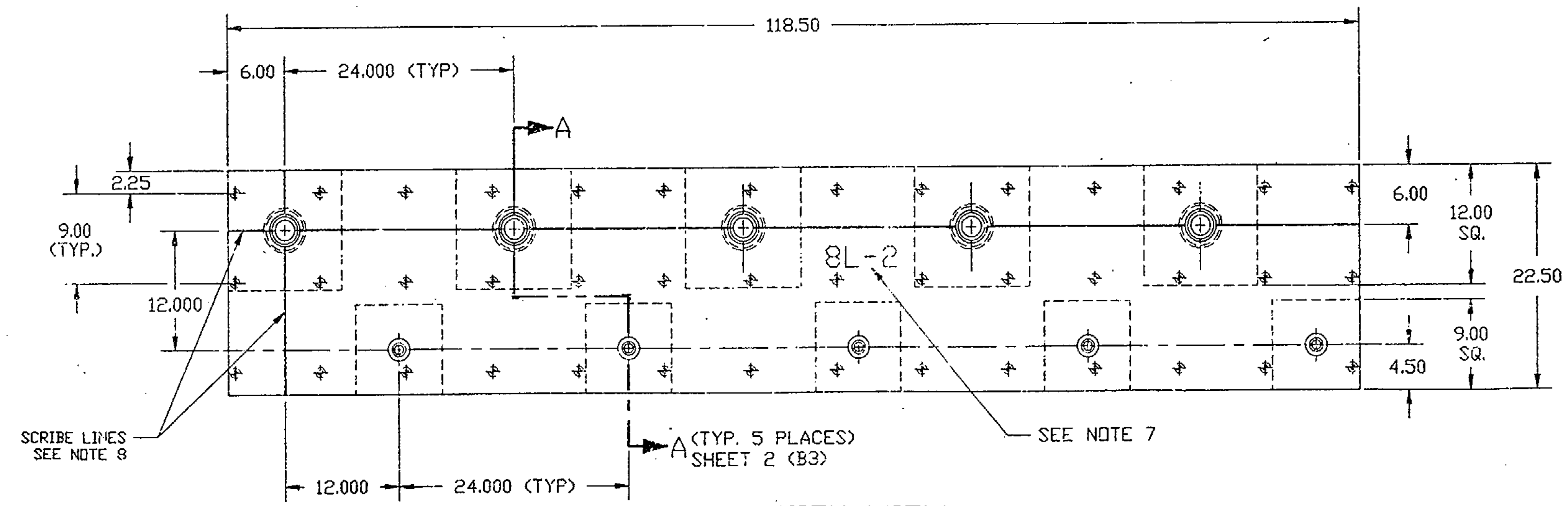
PNL - 704-02 8Q-2 PUMP PIT LINER LAYOUT
904D - 130 SMS 8Q-2 PUMP PIT LINER PLAN & SECTIONS



TYPICAL, 20 SLOTS, 4 PER ITEM 5
SCALE: 1/4



PLAN VIEW



ELEVATION VIEW

NOTES:

8 - PERMANENT SCRIBE LINES, .005" x .010" WIDE SHALL SERVE AS DATUMS FOR INSTALLATION OF THE WALL EMBEDMENTS. SCRIBE LINES TO EXTEND THE FULL WIDTH AND HEIGHT OF THE 1/2" SST PLATE AND ARE TO BE PRESERVED THROUGHOUT ASSEMBLY.

7 - IDENTIFICATION NUMBERS SHALL BE 2" IN HEIGHT AND STENCILED ON USING BLACK AMERLOCK 400 HIGH SOLIDS EPOXY COATING IN ACCORDANCE WITH AMERON PROTECTIVE COATINGS DIVISION APPLICATION INSTRUCTIONS.

6 - SENSITIVE LEAK TEST SHALL BE PERFORMED IN ACCORDANCE WITH PARAGRAPH 345.8 OF ANSI/ASME B31.3.

5 - RADIOGRAPHIC EXAMINATION SHALL BE PERFORMED IN ACCORDANCE WITH PARAGRAPH 344.5 OF ANSI/ASME B31.3.

4 - LIQUID DYE PENETRANT EXAMINATION SHALL BE PERFORMED IN ACCORDANCE WITH PARAGRAPH 344.4 OF ANSI\ASME B31.3.

3 - ALL WELDS SHALL BE VISUALLY INSPECTED IN ACCORDANCE WITH PARAGRAPH 344.2 OF ANSI/ASME B31.3 FOR PIPING AND AWS D1.1 SECTION 6.0 FOR STRUCTURAL WELDS.

2 - ALL WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1 FOR STRUCTURAL WELDS AND ANSI/ASME B31.3 FOR PIPING.

1 WVNS SUPPLIED

QTY REQD	ITEM NO.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	MATERIAL OR SPEC
A/R	11	NELSON STUD, 1/2 X 4-1/8	TYPE H4L	
A/R	10	PLATE, 1/2 THK.		A-240, 304L
A/R	9	PLATE, 1/2 THK.		A-240, 304L
A/R	8	PLATE, 1/2 THK.		A-240, 304L
A/R	7	PLATE, 1/2 THK.		A-240, 304L
A/R	6	PLATE, 1/2 THK.		A-240, 304L
A/R	5	4 DIA. PIPE SCHED 40S, SMLS		A-312, 304L
A/R	4	2 DIA. PIPE SCHED 40S, SMLS		A-312, 304L
A/R	3	1 DIA. PIPE SCHED 80S, SMLS		A-312, 304L
A/R	2	2 DIA. MALE CONN. NOZ.	DWG. PNL-334-01	A-351, CD-4MCu
A/R	1	1 DIA. MALE CONN. NOZ.	DWG. PNL-334-01	A-351, CD-4MCu

PARTS LIST

REV	SHEET	REV STATUS OF SHEETS
1	1	
2	1	

REV	DESCRIPTION	APVD
0	ER 1777 2/12/90	JRH
1	GEN. REV. PER ECN 3635 AWN 10/10/90	

UNLESS OTHERWISE SPECIFIED
ALL DIMENSIONS IN INCHES
TOLERANCES-DO NOT SCALE
2 PL DEC ±.12 | 3 PL DEC ±.031 | ANGLES ± N/A | N/A AA
FRACTIONS ± N/A
D.SPEC.NO. 1579
NEXT ASSEMBLY

		DATE
DRAFTER	W. KOCH	10/30/89
CHECKER	K. QUEALY	2/8/90
ENGR.	P. BEDNARZ	2/9/90
COG.MGR.APPVL	D.C. BURNS	2-9-90
E&DS APPVL	P.A. SZALINSKI	2/9/90
Q.A.APPVL	D.L. DEMPSTER	2-9-90
DFTG.SUPR.	JOHN HORTON	2/12/90

A/E CONTRACT NO. CODE IDENT. NO.

FOR
West Valley Nuclear Services Co.,Inc.
West Valley, New York

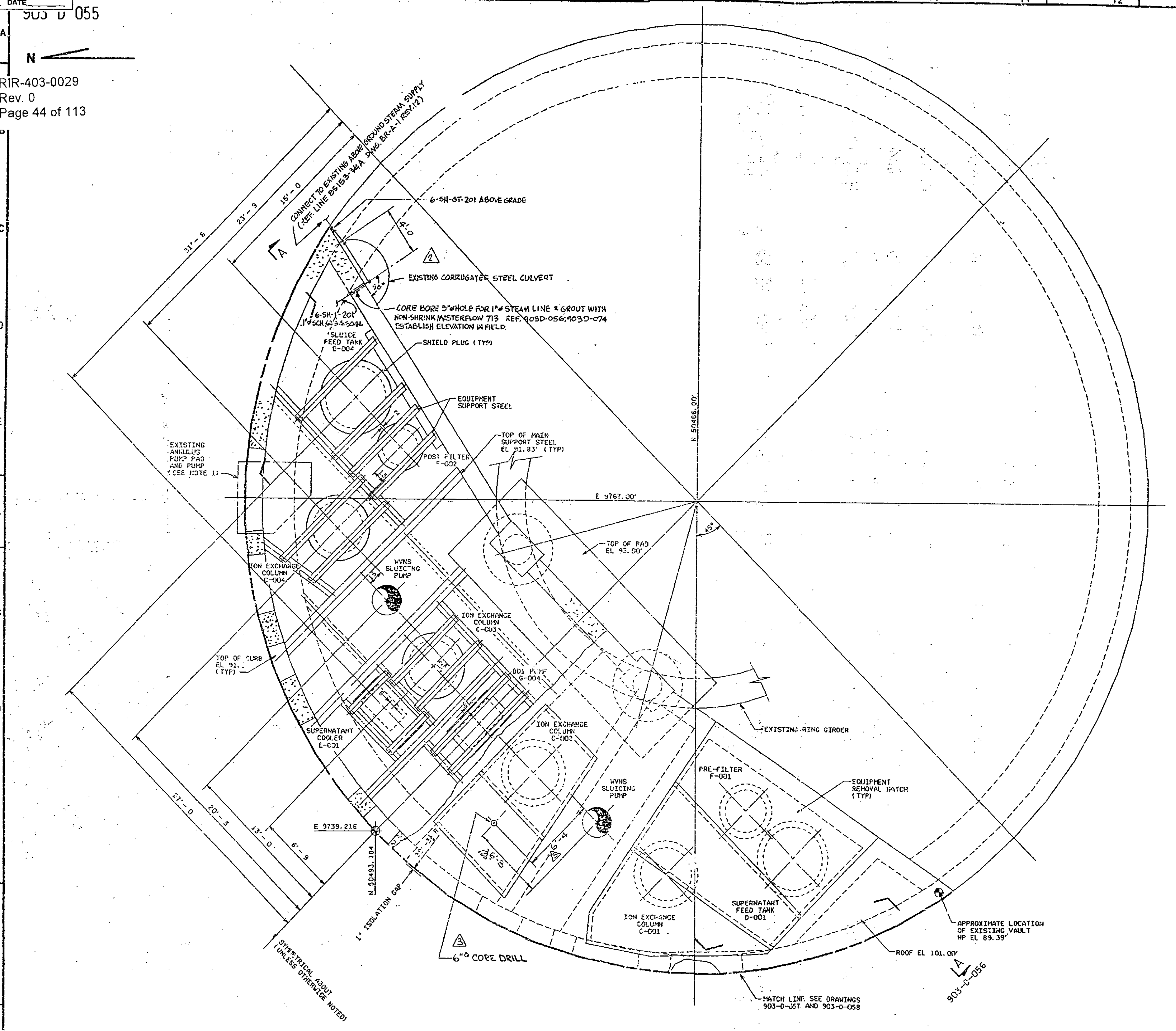
SMS
TRANSFER PIT 8Q-2
WALL NOZZLE EMBEDMENT ASSEMBLY

DWG SIZE D | SCALE 1/8 | WEIGHT 60 LBS. | DWG NO. 900D-2826 | REV 1
A/E DWG NO. | SHEET 1 OF 2

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

903 D 055



PLAN AT EL 88.50'

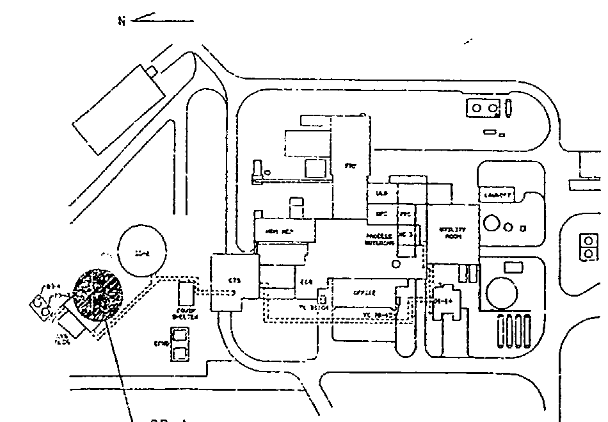
NO.	DATE	REVISION	DR	CH	APPROVED		
B	03-29-85	GENERAL REVISION	DH	RAN	RJL	MDW RNK	LES
C	06-13-85	REVISED PER WVNS COMMENTS ON EBAR 422	DH	RAN	RJL	MDW RNK	LES
D	12-12-85	REVISED PER WVNS COMMENTS ON EBAR 422A	DH	RAN	RJL		
0	2/7/86	ER 624					
1	2-28-86	REMOVED PIPE CHASE OPEN'G L&C 526	GPL				
2	7/1/87	REV'D. PER ECN 1264					
3	1-6-89	REV PER ECN 2753	GV				

GENERAL NOTES

1. WVNS TO MODIFY ANNULUS PUMP PAD TO CLEAR NEW EQUIPMENT SUPPORT STEEL AND CONCRETE COLUMNS.
2. WVNS SLUICING PUMPS MOUNTING AND EQUIPMENT DETAILS BY WVNS.
3. SECTION OF COVER PLATE OVER VALVE AISLE HATCH AND SECTION OF METAL BUILDING ROOF OVER VALVE AISLE HATCH TO BE REMOVABLE. BOTH REMOVABLE SECTIONS TO HAVE MIN 6'-0 x 8'-0 OPEN AREA DIRECTLY ABOVE VALVE AISLE HATCH.

REFERENCE DRAWINGS

GENERAL ARRANGEMENT - STS BLDG - 8D1 TANK SECTION — DRAWING NO. 903-D-056
GENERAL ARRANGEMENT - STS BLDG AND 8D-3 & 4 TANKS PLAN EL 92.00' — DRAWING NO. 903-D-057
GENERAL ARRANGEMENT - STS BLDG PLAN EL 107.00' — DRAWING NO. 903-D-058
GENERAL ARRANGEMENT - STS BLDG PLAN AND SECTIONS — DRAWING NO. 903-D-059



KEY PLAN

0 4 8 12 16FT
1/4"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/L G.F.S. NO. 2383 TASK ORDER 014
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT

GENERAL ARRANGEMENT
STS 8D1 TANK
PLAN 88.50'

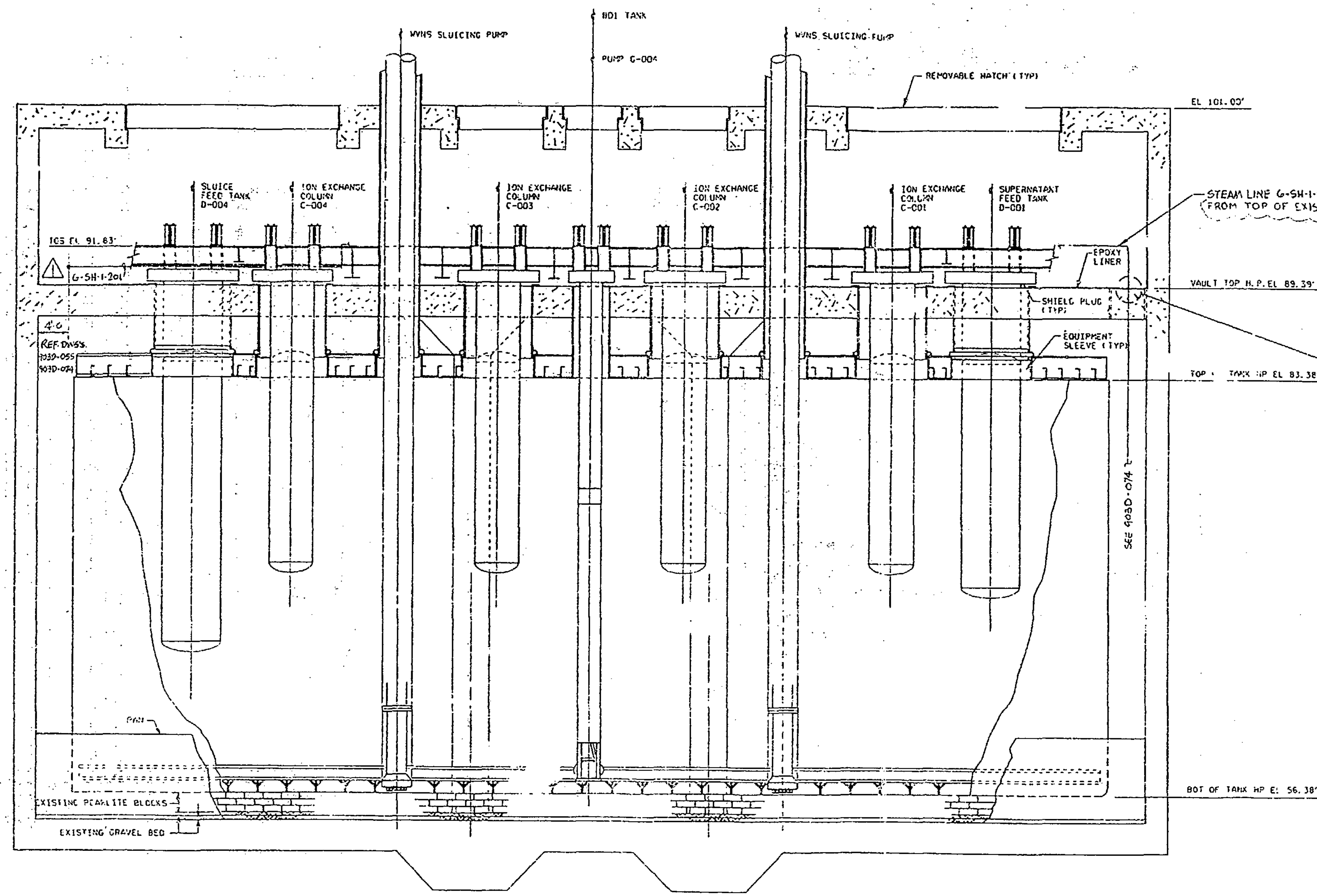
APPRVD. WVNS CO.
PROJECT MGR L. E. SHAW
ENGINEER SUPV W. WEINHART
LEAD DISC ENGR R. FEEMAN
DESIGN R. J. LEWKS
CHECKED S. J. WELCH
DRAWN D. HARDY — DATE 10-3-84
DE-AC07-81NE44139 PROJECT NO.
15-CWV-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

SIZE	INDEX CODE NUMBER	DRAWING NO.	REV.
D		903D-055	3
SCALE 1/4"=1'-0	SPEC. CODES	A/E SHEET NO. 903-D-055	D

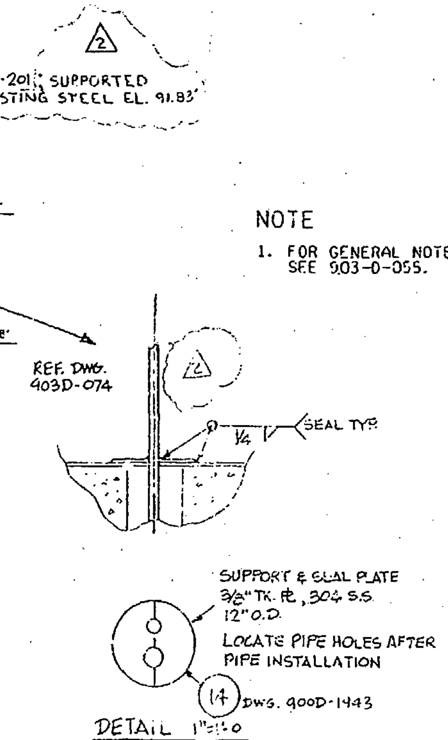
VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

056

NO.	DATE	REVISION	DR	CH	APPROVED
B	03-29-85	GENERAL REVISION	DH	RAW	RJL LES
C	6-13-85	REVISED PER WVNS COMMENTS ON EBAR 422	DH	RAW	RJL WDW RNK LES
D	12-12-85	REVISED PER WVNS COMMENTS ON EBAR 422A	RJL	RAW	RJL
0	2/7/86	ER 624			
1	7/20/87	REV'D. PER ECN 1764			
2	8/6/87	REVISED PER ECN 1831	LRS		



SECTION A-A
903-0-055
(B3)



DETAIL 1"=1-0

NOTE

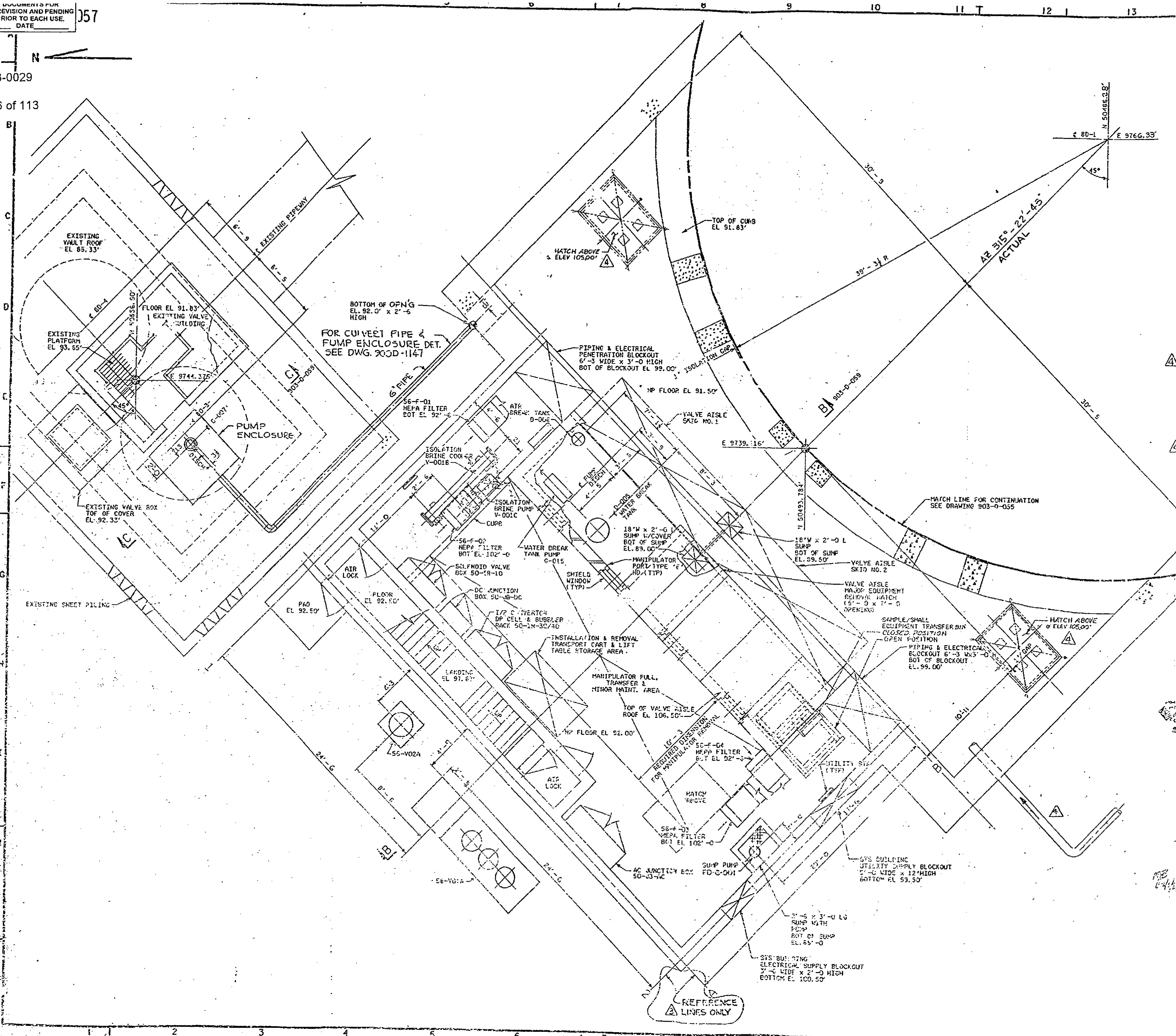
1. FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE 903-0-055.

0 4 8 12 16FT
1/4"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

APPRVD WVNS CO.	EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2388 TASK ORDER 014
PROJECT MGR L. E. SHAW 10-3-84	FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
ENGINEER SUPV A. TEINSAAS 10-3-84	
LEAD DISC ENGR P. KEENAN 10-3-84	WEST VALLEY DEMONSTRATION PROJECT
DESIGN R. J. LEWKS 10-3-84	GENERAL ARRANGEMENT STS 8D1 TANK SECTION
CHECKED S. J. WELCH 10-3-84	
DRAWN B. INGANAMORTE DATE 10-3-84	
DE-AC07-81NE44139 PROJECT NO.	SIZE D — INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG — DRAWING NO. 903D-056 — REV. 2
18-CWV-02275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	SCALE 1/4"=1'-0 — SPEC. CODES — A/E SHEET NO. 903-D-056 — D

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_________ DATE_________



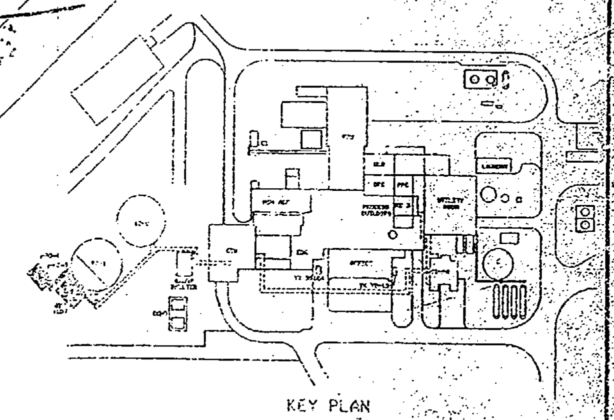
NO.	DATE	REVISION	DR	CH	APPROVED		
B	04-19-85	GENERAL REVISION	DH	RAN	RJL	NDW RNK	LES
C	06-13-85	REVISED PER WVNS COMMENTS ON EBAR 442 & 508	DH	RAN	RJL	NDW RNK	LES
D	12-2-85	REVISED PER WVNS COMMENTS ON EBAR 442 A&B	DH				
0	2/7/86	ER 624					
1	3-3-86	CHG'D TRANS. BIN, ... 8B TANK & W.B. PUMP, VALVE AISLE HATCH RELOC'D, MAINT HATCH REVISED DFC 528	GPL				
2	4-11-86	REV. PER DFC 620	SJS				
3	7-24-86	ADDED NOTE/ECN # 643	DRS				
4	9-23-86	ECN 899	CH				

NOTES

1. FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE DRAWING 903-D-055.

OPEN ITEMS

1.
2. NO CONSIDERATION HAS BEEN GIVEN TO PIPING REQUIRED FOR "SLUDGE MOBILIZATION".
3.
4. ISOLATION COOLER TUBE BUNDLE CAN NOT BE PULLED IN PLACE DUE TO LIMITED SPACE.
5.
6.
6.
9. ISOLATION BRINE PUMP HEAD TANK NOT LOCATED.



0 4 6 12 16FT
1/4"=1'-0"

FOR DRAWING INDEX SEE DRAWING NO.

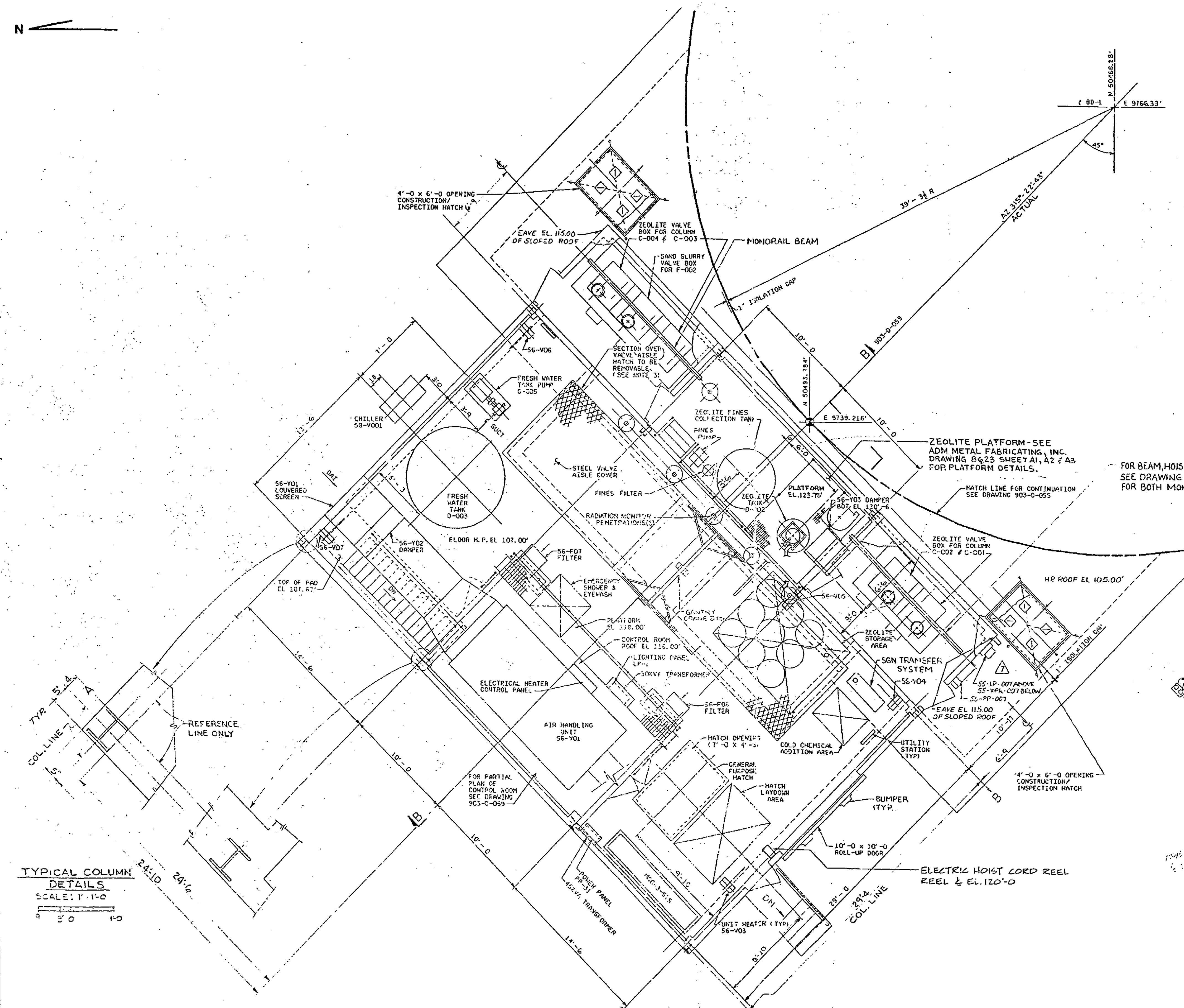
EBASCO SERVICES INCORPORATED
TASK ORDER 014
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
GENERAL ARRANGEMENT
STS BLDG AND 8D-1&4 TANKS
PLAN EL 92.00'
DRAWING NO. 903D-057
SCALE 1/4"=1'-0"
SIZE D
ISSUED FOR CONSTRUCTION

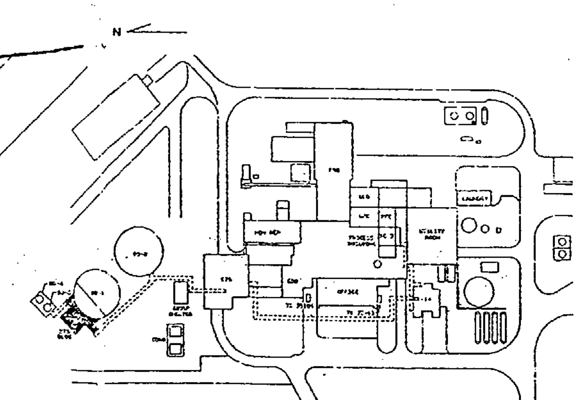
903 D-058

NO.	DATE	REVISION	DR	CH	APPROVED
B	09-13-85	GENERAL REVISION & WVNS COMMENTS ON EBAR 508	DH	RAW	RJL NDW RNK LES
C	12-2-85	GENERAL REVISION & WVNS COMMENTS ON EBAR 442 A&B	RJL	RON	
0	2/7/86	ER 624			
1	3-3-86	REMOVED ZEOLITE CONV. & HOPPER, MOD. ZEOLITE TANK, RELOC'D INSPECTION HATCH'S ADD RAD. MONIT' PENETRATIONS DFC-528	GPL		
2	7/24/86	CHGD. COL. LINE/ECN#643	DES		
3	9-23-86	ECN 899	CH		
4	10/13/86	REV. PER ECN 1094	JAW		
5	1/15/88	REV. PER ECN 2150	DAS		
6	4/13/88 5-3-88	REV PER ECN 2153 " " " #2395	CCG DES		
7	4-20-2001	ECN 12791	CAM		

NOTE

1. FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE DRAWING 903-D-055.





KEY PLAN

0 4 8 12 16FT
1/4"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

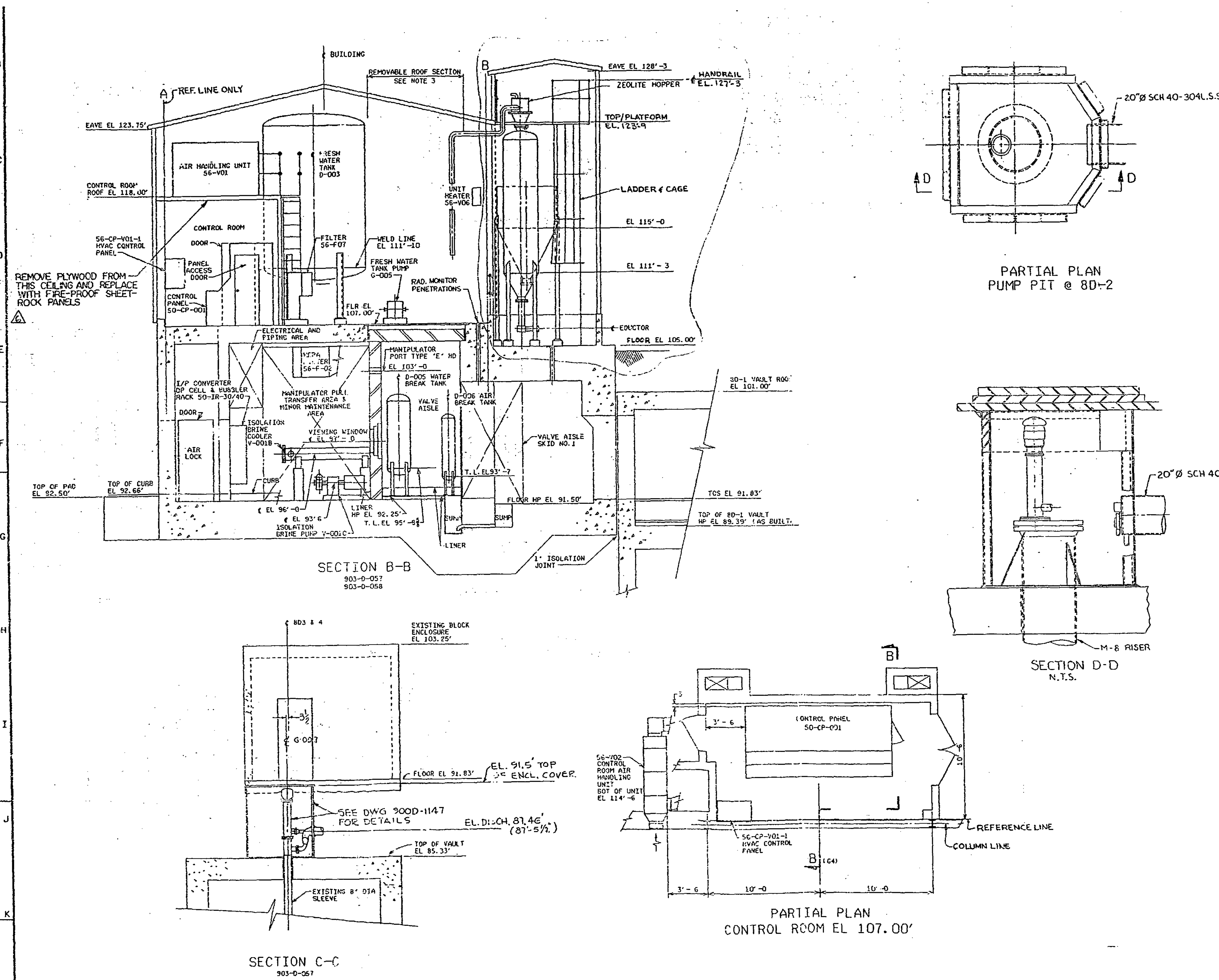
APPR'D WVNS CO.	2/5/86
PROJECT MGR L. E. SHAW	1-19-85
ENGINEER SUPV K. D. FEINGART	1-19-85
LEAD DISC ENGR R. KEEMAN	1-19-85
DESIGN R. J. LEDKO	1-19-85
CHECKED R. MILLER	1-19-85
DRAWN D. HARDY	DATE 1-19-85
DE-AC07-81NE44139 PROJECT NO.	
19-CWV-02275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 014
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

GENERAL ARRANGEMENT
STS BUILDING
PLAN EL 107.00'

SIZE D | INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG | DRAWING NO. 903D-058 | REV. 7
SCALE 1/4"=1'-0 | SPEC. CODES | A/E SHEET NO. 903-D-058



NO.	DATE	REVISION	DR	CH	APPROVED		
~~B~~	~~8-23-85~~	~~GENERAL REVISION & WVNS COMMENTS ON EBAR 508~~	~~DH~~	~~RAH~~	~~RJL~~	~~NDW RNK~~	~~LES~~
~~C~~	~~12-2-85~~	~~GENERAL REVISION & WVNS COMMENTS ON EBAR 442 A&B~~	~~AJL~~	~~BDM~~	~~Dgi WS~~	~~Rmk~~	~~NDW~~
0	2/1/86	ER624			JoH		
1	3-4-86	ADDED ZEOLITE HOPPER. REMOVED NOTE 4 IN OPEN ITEMS ., ADDED RAD MONITOR LOC, REMOVED ZEOLITE SCR CONV. LOAD HOP & DUST COLL. DFC 528	GPL		JEB		
2	4-11-86	REV. PER DFC 620	SJS	BK	BK		
3	7-24-86	MOVE COL.LINE/ECN#643	DRS.	myB	myB		
4	9-24-86	ECN 899	CH	SWS	SWS		
5	5-4-88	REV./ECN#2395	DRS		JJW 5/4/88		
6	9-21-89	REV.PER ECN # 3164	CGR	KMQ	RKS		

NOTE

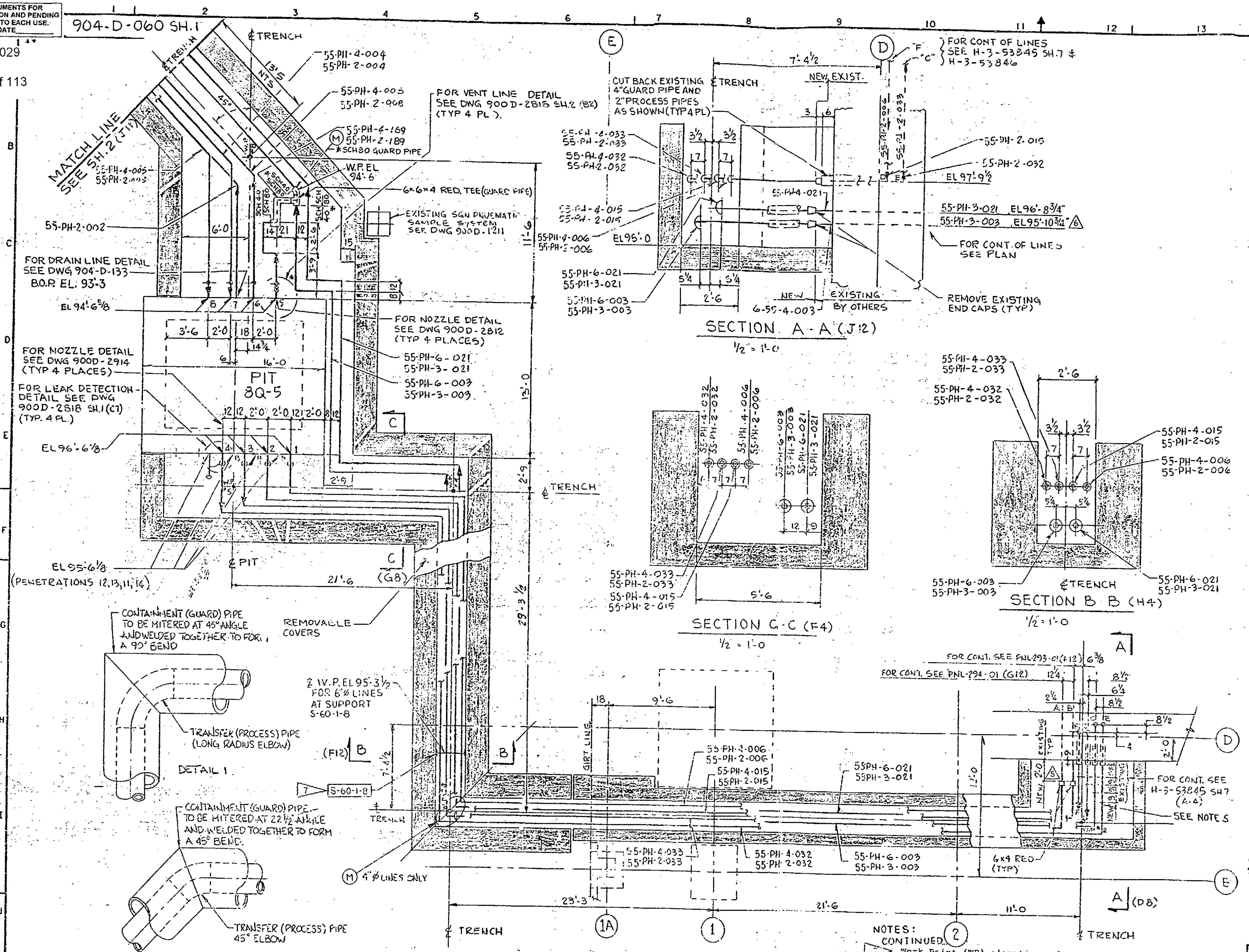
1. FOR GENERAL NOTES AND REFERENCE DRAWINGS SEE DRAWING 903-D-055.

0 4 8 12 16FT
1/4"=1'-0

FOR DRAWING INDEX SEE DRAWING NO. ______

APPRVD WVNS CO.		EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2388 TASK ORDER 014 FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
PROJECT MGR L. E. SHAW	4-19-85	
ENGINEER SUPV D. D. WEINGART	4-19-85	
LEAD DISC ENGR R. KEENAN	4-19-85	WEST VALLEY DEMONSTRATION PROJECT
DESIGN R. J. LEWKO	4-19-85	GENERAL ARRANGEMENT STS BUILDING PLAN AND SECTIONS
CHECKED R. MILLER	4-15-85	
DRAWN D. HARDY	DATE 4-19-85	
DE-AC07-81NE44139 PROJECT NO.		SIZE D; INDEX CODE NUMBER (AREA, DR. TYP, CL, ORIG); DRAWING NO. 903D-059; REV. 6
19-CWV-02275 SUBCONTRACT NO.		
ISSUED FOR CONSTRUCTION		SCALE 1/4"=1'-0; SPEC. CODES; A/E SHEET NO. 903-D-059

904-D-060 SH.1



REV NO	DATE	REVISION	DR	CH	APPROVED
B	4/-/90				
		GENERAL REVISION			
0	6/8/90	ER1874			
1	6/26/90	REV. PER ECN 3742	CGR		
2	10-12-90	REV. PER ECN 3930	GW		
3	5-1-92	REV. PER ECN 4831	PD		
4	6-1-92	REV. PER ECN 5155			
5	8-10-92	REV/FCN VF-28-0063	PD	HB	
6	11-2-93	REV/ECN 7016	PD		

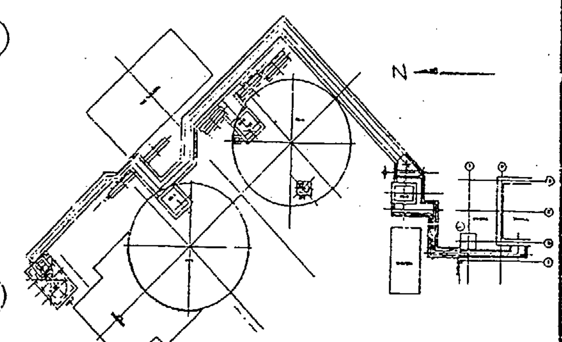
NOTES:

1.
2. ALL TRANSFER PIPING ELBOWS TO BE LONG RADIUS. ALL CONTAINMENT (GUARD) PIPING ELBOWS TO BE SHORT RADIUS UNLESS INDICATED BY (H), WHICH WILL BE GUARD PIPE MITERED TO FORM THE REQUIRED BEND. SEE DETA. 1 OR 2 AS REQUIRED
3. NO ALLOWANCE HAS BEEN MADE FOR WELDS & GASKETS.
4. FITTINGS & COMPONENTS NOT DIMENSIONED ARE FITTING TO FITTING.
5. CUT BACK EXISTING PIPING TO INSTALL NEW ANCHORS FOR TRANSFER LINES TO GUARD PIPE SEE DWG. 904D-560
6. WORK POINT (WP) LOCATIONS SEE 900D-2960

CONTINUED BELOW

REF DWG'S.

SMS TRANSFER LINES LEAK DETECTION	900D-2815
SMS HLW TRANSFER PIPING	904D-060 SH. 2
SMS PIT LINER TYP SECT & DET'S.	904D-133
CONDENSATE HEADER TO FD-2	PNL-293-01
WASTE HEADER 8S-V-045	PNL 294 01
VIT CELL WEST WALL COL. 2 & 3 MODULE INSTALLATION	H-3-53846
SMS 2" VERTICAL WALL NOZZLE WALL EMBEDMENT 8Q-1	900D-2812
SMS TRANSFER PIT 8Q-5 WALL NOZZLE EMBEDMENT ASSY	900D-2914 SH.1
SMS 2" DRAIN LINE INTERFACE DET.	904D-133
VIT. CELL WEST WALL COL. 2 & 3 COMPONENT MODULE	H-3-53845 SH.7
HLW TRANSFER PROCESS PIPING SUPPORT LOCATIONS	904D-560
℄ S.M.S TRENCH	900D-2960


KEY PLAN

NOTES:
CONTINUED

7. Work Point (WP) elevations shown, except as otherwise noted, are for center line of pipe.
8. All pipe segments between the Vitrification Facility and Pit 8Q-1 shall slope continuously from the high point elevation of the pipe to the low point elevation of the pipe at 1/8" (+1/16", -1/16") per foot. Pipe segments between Pit 8Q-1 and Pit 8Q-4 shall slope continuously at 1/4" (+1/8", -1/8") per foot. Work Point elevations, and length of pipe from WP's establish slope within each segment
9. Each pipe segment shall be run with the noted slope from point to point using ending embed Work Point elevations unless intermediate WP elevations are give. If an intermediate WP elevations are given, the pipe segment shall be worked from each of the given WP's while maintaining the noted slope from the high elevation to the low elevation of the two end points.

WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

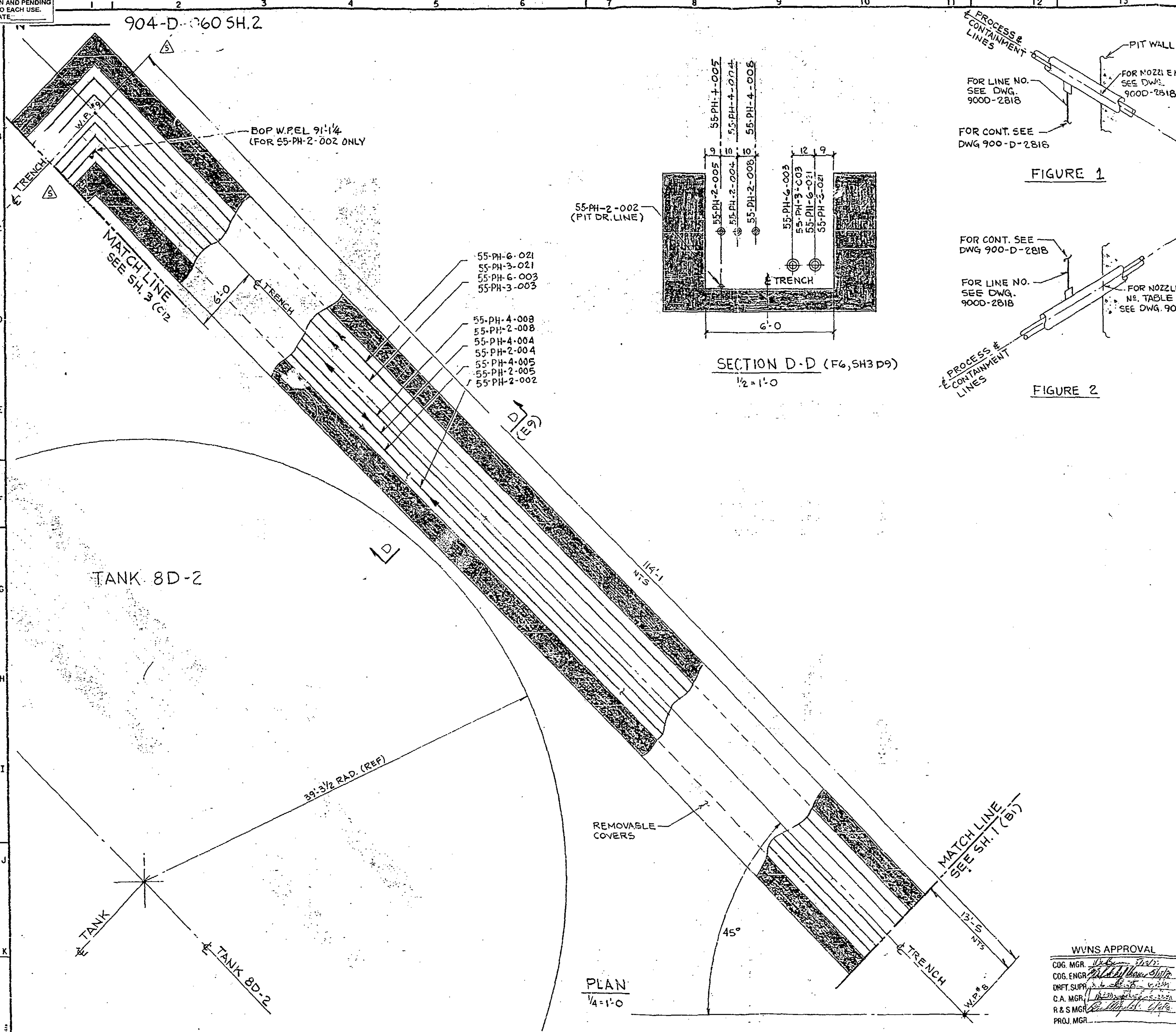
APPRVD WVNS CO.	
PROJECT MGR	8/25/89
ENGINEER SUPV	8/25/89
LEAD DISC ENGR	8/25/89
DESIGN R.J. ENKO	8/25/89
CHECKED A.V. RGO	8/25/89
DRAWN S. ELIA	DATE 8/25/89
DF-AC07-81NE44139 PROJECT NO.	
19-CWV-02275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	

EBASCO SERVICES INCORPORATED
A/E G.F.S. NO. 2388 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
HLW TRANSFER PIPING

SIZE	INDEX CODE NUMBER (AREA / DR. TYP / CL / ORIG)	DRAWING NO.	REV.
D		904D-060	6
SCALE AS NOTED	SPEC. CODES	A/E SHEET NO. 904-D-060 SH1 B	

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

904-D-060 SH.2

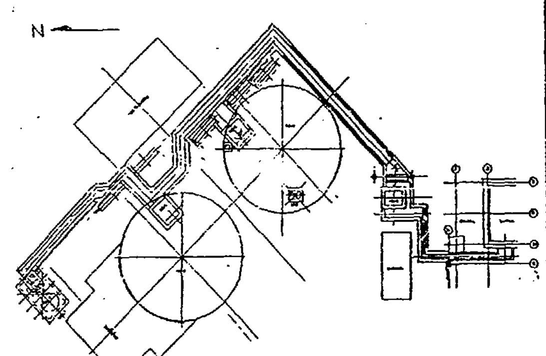


REV NO	DATE	REVISION	DR	CH	APPROVED
B	4/13/90		PLP	ATV	
		GENERAL REVISION			
0	6/8/90	ER 1874			
1	6/28/90	REV. PER ECN 3742	CGR	HAB	J.M.
2	10-12-90	REV. PER ECN 3930	GW	HAB	
3	5-4-92	GEN REV PER ECN 4831	PD	HAB	
4	5-28-92	REV. PER ECN 5155	DAK	DRS	
5	8-10-92	REV/FCN VF-2B-0063	PD	HPB	

NOTE
FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG. 904-D-060 SH.1

REF. DWG'S:

SMS HLW TRANSFER PIPING	904D-060 SH.1
SMS HLW TRANSFER PIPING	904D-060 SH.3
SMS TRANSFER LINES LEAK DETECTIONS	900D-2818



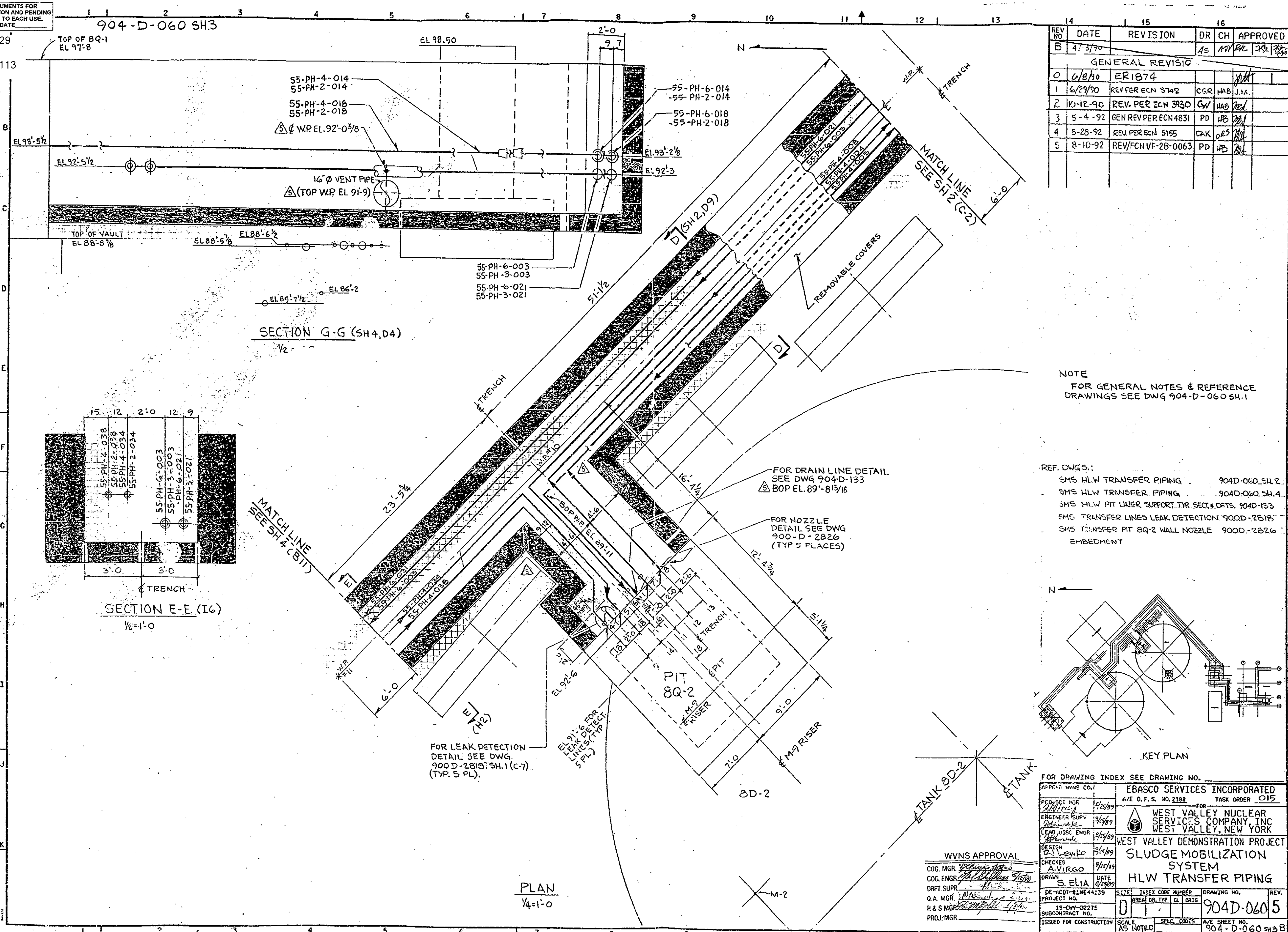
KEY PLAN

WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
C.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

APPRVD WVNS CO.		EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2388 TASK ORDER 018
PROJECT MGR	8/25/89	FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
ENGINEER SUPV	8/25/89	
LEAD DISC. ENGR	8/25/89	WEST VALLEY DEMONSTRATION PROJECT
DESIGN K. JLEWKO	8/25/89	SLUDGE MOBILIZATION SYSTEM HLW TRANSFER PIPING
CHECKED A. VIRGO	8/25/89	
DRAWN S. ELIA	DATE 8/25/89	

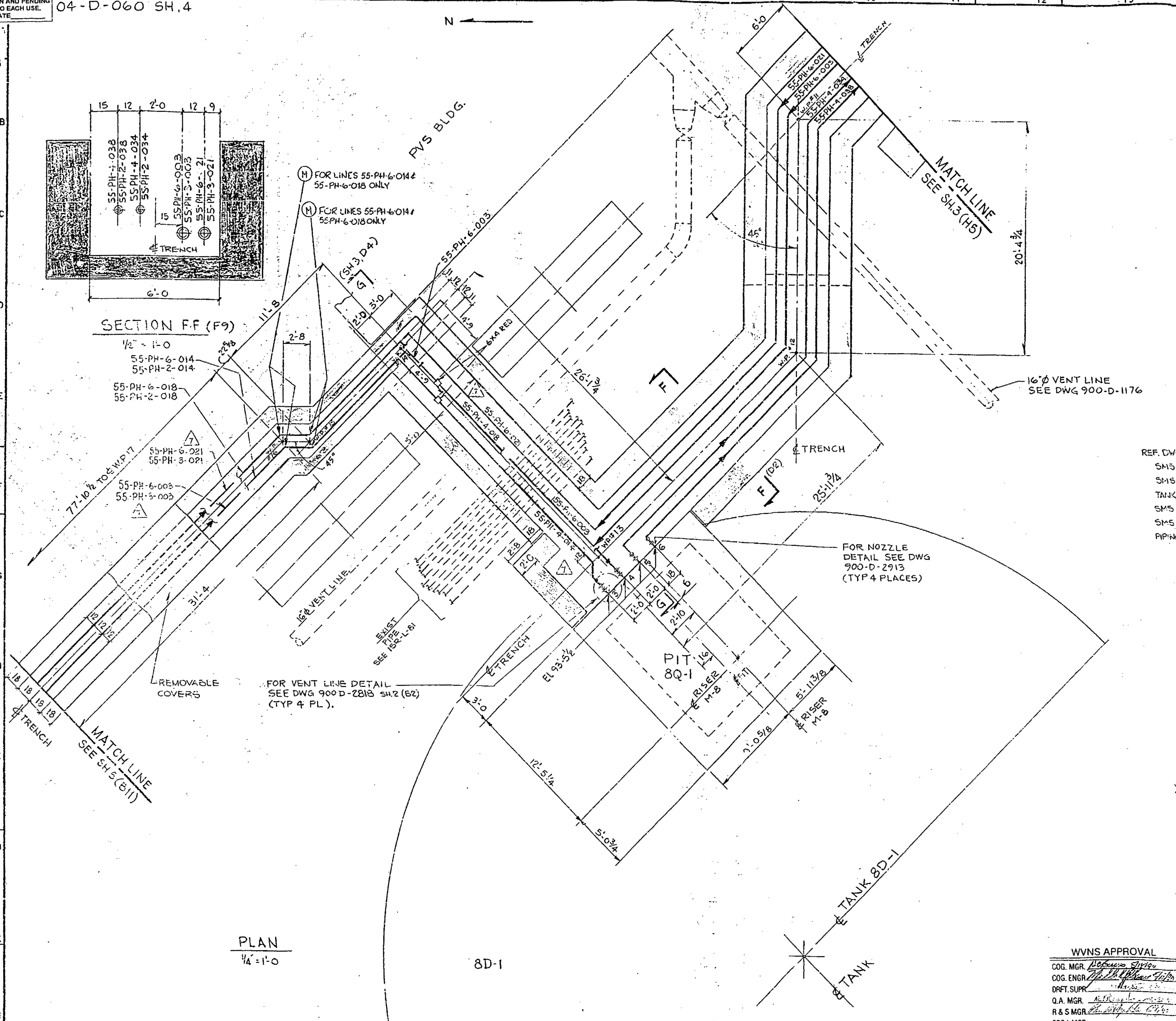
DE-AC07-81NE44139 PROJECT NO.	SIZE D	INDEX CODE NUMBER (AREA / DR. TYP / CL / ORIG)	DRAWING NO. 904D-060	REV. 5
19-CWV-02275 SUBCONTRACT NO.				
ISSUED FOR CONSTRUCTION	SCALE AS NOTED	SPEC. CODES	A/E SHEET NO. 904-D-060 SH2	B


904-D-060 SH.3
TOP OF 8Q-1 EL 97'-8
EL 98.50
2'-0
55-PH-4-014
55-PH-2-014
55-PH-4-018
55-PH-2-018
℄ W.P. EL.92'-0 3/8
55-PH-6-014
55-PH-2-014
55-PH-6-018
55-PH-2-018
EL 93'-5 1/2
EL 92'-5 1/2
EL 93'-2 1/8
EL 92'-3
16"Ø VENT PIPE
(TOP W.P. EL 91'-9)
TOP OF VAULT EL 88'-8 3/8
EL 88'-5 1/8
EL 88'-6 1/2
55-PH-6-003
55-PH-3-003
55-PH-6-021
55-PH-3-021
EL 85'-7 1/2
EL 86'-2
SECTION G-G (SH4,D4)
55-PH-4-038
55-PH-2-038
55-PH-4-034
55-PH-2-034
55-PH-6-003
55-PH-3-003
55-PH-6-021
55-PH-3-021
3'-0
3'-0
℄ TRENCH
SECTION E-E (I6)
1/2=1'-0
N
MATCH LINE SEE SH 2 (C-2)
MATCH LINE SEE SH 4 (B11)
REMOVABLE COVERS
51'-1 1/2
23'-5 3/4
16'-4 1/4
12'-4 3/4
5'-1 1/4
6'-0
FOR DRAIN LINE DETAIL SEE DWG 904-D-133
BOP EL.89'-8 13/16
FOR NOZZLE DETAIL SEE DWG 900-D-2826 (TYP 5 PLACES)
BOP W.P. EL 89'-11
PIT 8Q-2
℄ PIT
M-9 RISER
℄ M-9 RISER
EL 92'-6
EL 91'-6 FOR LEAK DETECT. LINES (TYP 5 PL)
FOR LEAK DETECTION DETAIL SEE DWG. 900 D-2818; SH.1 (C-7) (TYP. 5 PL).
8D-2
℄ TANK 8D-2
℄ TANK
M-2
PLAN
1/4=1'-0
NOTE
FOR GENERAL NOTES & REFERENCE DRAWINGS SEE DWG 904-D-060 SH.1
REF. DWGS.:
SMS HLW TRANSFER PIPING 904D-060 SH.2
SMS HLW TRANSFER PIPING 904D-060 SH.4
SMS HLW PIT LINER SUPPORT TYP. SECT. & DETS. 904D-133
SMS TRANSFER LINES LEAK DETECTION 900D-2818
SMS TRANSFER PIT 8Q-2 WALL NOZZLE EMBEDMENT 900D-2826
KEY PLAN
REV NO | DATE | REVISION | DR | CH | APPROVED
B | 4/3/90 | GENERAL REVISION | AS
0 | 6/8/90 | ER1874
1 | 6/29/90 | REV PER ECN 3742 | CGR | HAB | J.M.
2 | 10-12-90 | REV. PER ECN 3930 | GW | HAB
3 | 5-4-92 | GEN REV PER ECN 4831 | PD | HB
4 | 5-28-92 | REV. PER ECN 5155 | DAK | DRS
5 | 8-10-92 | REV/FCN VF-2B-0063 | PD | HB
FOR DRAWING INDEX SEE DRAWING NO.
EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 015
FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
HLW TRANSFER PIPING
DESIGN R.J. LENKO
CHECKED A. VIRGO
DRAWN S. ELIA
DE-AC07-81NE44139
19-CW-02275
ISSUED FOR CONSTRUCTION
SIZE D
SCALE AS NOTED
DRAWING NO. 904D-060 REV. 5
A/E SHEET NO. 904-D-060 SH3 B
WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

04-D-060 SH.4

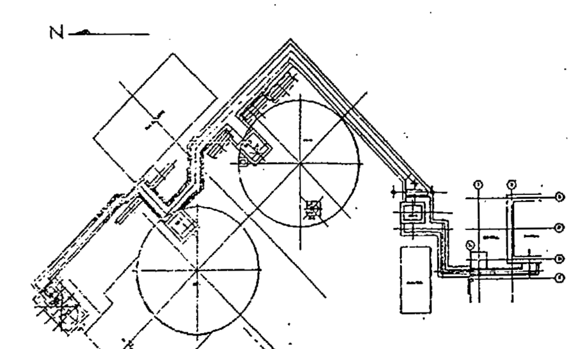
REV NO	DATE	REVISION	DR	CH	APPROVED		
B	4/13/90		AS	ATV	[illegible]	[illegible]	[illegible]
GENERAL REVISION							
0	6/8/90	ER1874			[illegible]		
1	6/29/90	REV. PER ECN 3742	CGR	HAB	J.M.		
2	10-23-90	REV. ECN 3930 & 3930A	GW	HAB	[illegible]		
3	5-4-92	GEN REV PER ECN 4831	PD	HB	[illegible]		
4	6-1-92	REV. PER ECN 5155	PAK	DRS	[illegible]		
5	6-26-92	REV. PER FCN VF-2B-0114	AAJ	HB	[illegible]		
6	8-10-92	REV/FCN VF-2B-0063	PD	HB	[illegible]		
7	2-15-95	REV/ECN 8636	MJL	DRS	[illegible]		



NOTE
FOR GENERAL NOTES & REFERENCE DRAWINGS SEE 904-D-060 SH.1

REF. DWG'S.:

SMS HLW TRANSFER PIPING	904D-060 SH.3
SMS HLW TRANSFER PIPING	904D-060 SH.5
TANK FARM VENTILATION TANKS 8D-1 & 8D-2	900D-1176
SMS TRANSFER LINES LEAK DETECTION	900D-2818
SMS 2" HORIZ. 4 NOZZLE WALL EMBEDMENT	900D-2913
PIPING ARRANGEMENT INTERCONNECTING LINES	15R-L-81



KEY PLAN

FOR DRAWING INDEX SEE DRAWING NO. ______

WVNS APPROVAL
COG. MGR. [signature]
COG. ENGR. [signature]
DRFT. SUPR. [signature]
Q.A. MGR. [signature]
R & S MGR. [signature]
PROJ. MGR. ______

APPRVD WVNS CO.
PROJECT MGR [signature] 8/25/89
ENGINEER SUPV [signature] 8/25/89
LEAD DISC ENGR [signature] 8/25/89
DESIGN RJ LENKO 8/25/89
CHECKED A. VIRGO 8/25/89
DRAWN S. ELIA DATE 8/25/89
DE-AC07-81NE44139 PROJECT NO.
19-CWV-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

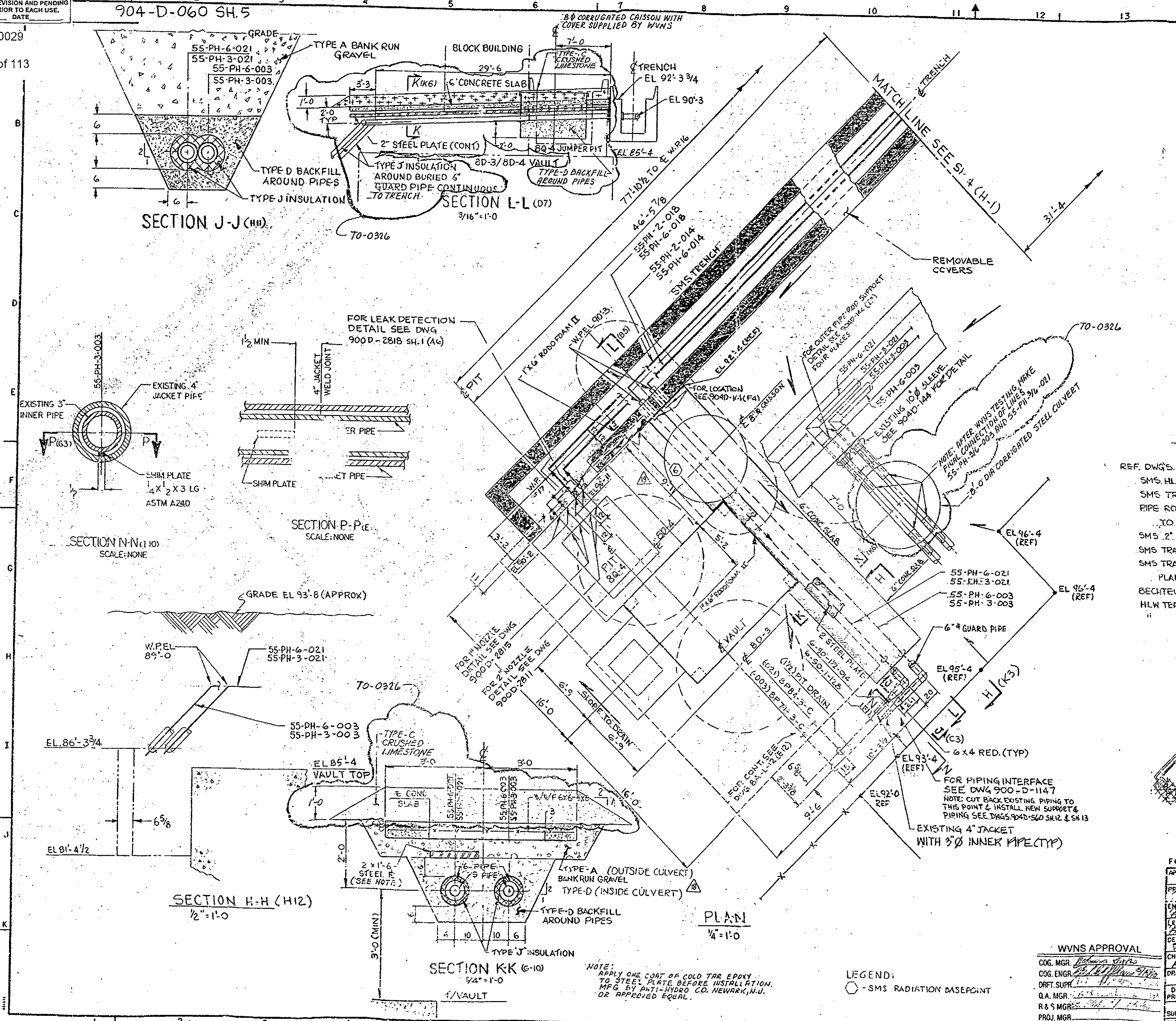
EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
HLW TRANSFER PIPING

SIZE D | INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG | DRAWING NO. 904D-060 | REV. 7
SCALE AS NOTED | CODES | A/E SHEET NO. 904-D-060 SH 4 B

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_____ DATE_____

904-D-060 SH.5



NOTE:
APPLY ONE COAT OF COLD TAR EPOXY TO STEEL PLATE BEFORE INSTALLATION. MFG BY PHTI-HYDRO CO. NEWARK, N.J. OR APPROVED EQUAL.

LEGEND:
◯ - SMS RADIATION BASEPOINT

REV NO	DATE	REVISION	DR	CH	APPROVED
~~B~~	~~4/13/90~~	~~GENERAL REVISION~~	PLP		
~~C~~	~~4/19/90~~	~~GENERAL REVISION~~			
0	6/8/90	ER1874			
19	5/20/96	REV/ECN 9946	SRD		
2	10-15-90	REV. PER ECN 3930	GW	AAB	
3	11/5/90	REV PER ECN 4022	KKG	HAB	
4	5-4-92	GEN REV PER ECN 4831	PD		
5	6-1-92	REV PER ECN 5155	DAK	DRS	
6	8-10-92	REV/FCN VF-2B-0063	PD		
7	4-27-93	GEN REV PER ECN 6059	PD		
8	6-18-93	REV/FCN VF-2B-0981	PD	DRS	
9	9-8-93	REV/FCN VF-2B-0980	RMS		P.B.
10	9-27-93	REV/ECN 6647A	PD	DRS	P.B.
11	1-12-94	REV/FCN VF-2B-1599	AAJ		P.B.
12	5-24-94	REV/FCN VF-2B-1142	DJN		P.B.
13	6-21-94	REV/FCN VF-2B-2321	MJL		P.B.
14	7-9-94	REV/FCN VF-2B-2401	PD	ARA	P.B.
15	9-19-94	REV PER FCN 2402	GW		P.B.
16	11-21-94	REV/FCN VF-2B-1561	PD		P.B.
17	11-1-95	REV/ECN 9509	RMS		
18	4-16-96	REV/F[illegible] 245	SRD		

NOTES:
FOR GENERAL NOTES & REFERENCE DRAWINGS SEE 904-D-060 SH.1

⟹ DENOTES DIRECTION OF SLOPE AT FINISHED GRADE. ELEVS DENOTES TOP OF SLOPE AT FINISHED GRADE.

REF. DWG'S.:

SMS HLW TRANSFER PIPING	904D-060 SH.4
SMS TRENCH PLAN & SECT'S. SH. 4	904D-144
PIPE ROUTING & MECH. DET. FROM VALVE AISLE TO 8D-3	900D-1147 SH.1
SMS 2" HORIZ. 2 NOZZLE WALL EMBEDMENT	900D-2811
SMS TRANSFER PIT 8Q-4 1" WALL NOZZLE EMBED.	900D-2815
SMS TRANSFER LINES LEAK DETECTION PIPING PLAN & SECTIONS	900D-2818
BECHTEL CON-ED WASTE STORAGE TANKS	8A-L-12
HLW TRANSFER PROCESS PIPING SUPPORT LOCATIONS	904D-560 SH.12
" " " " " "	904D-560 SH.13

FOR DRAWING INDEX SEE DRAWING NO.

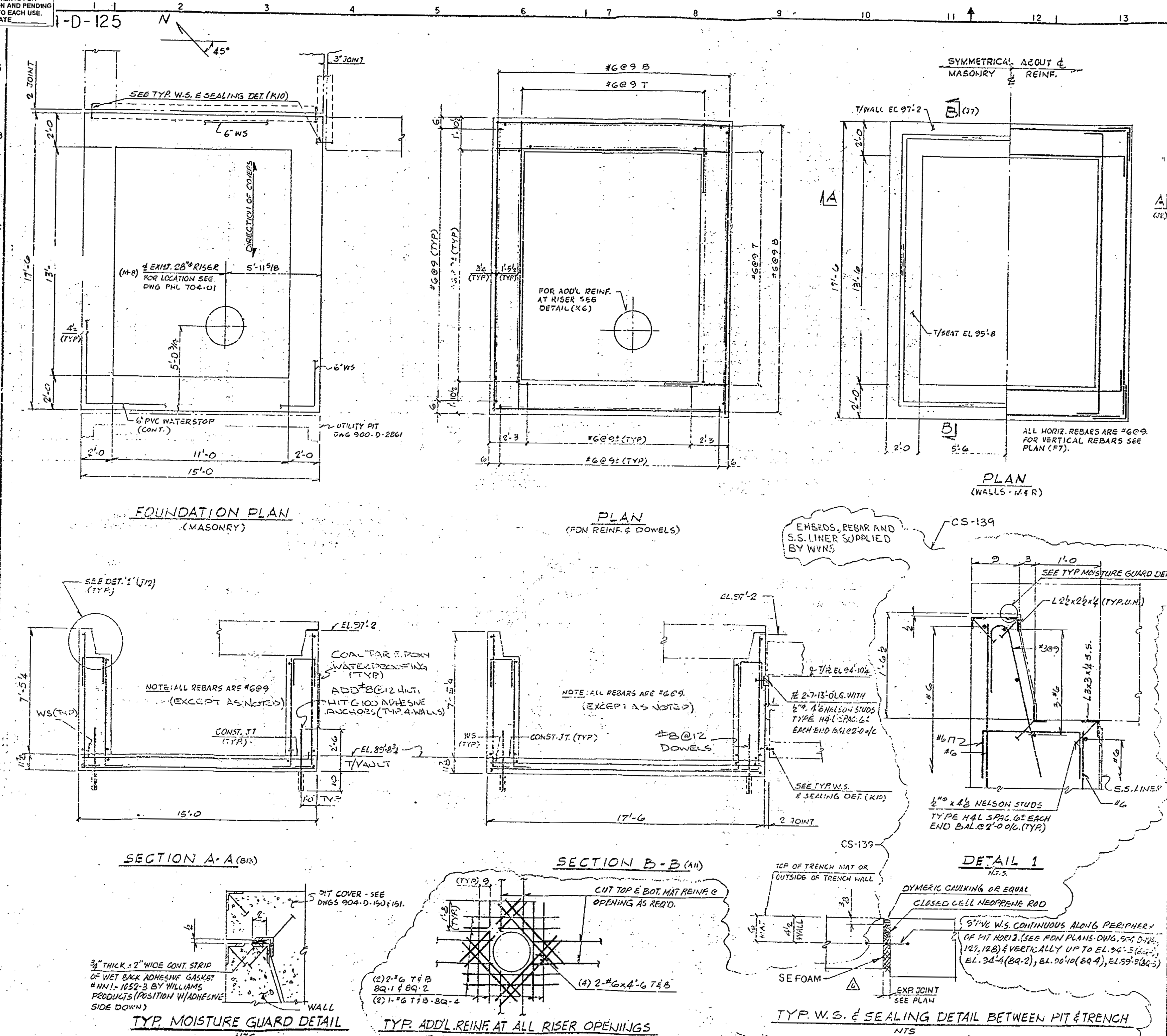
WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

APPRVD WVNS CO.
PROJECT MGR 8/25/89
ENGINEER SUPV 8/25/89
LEAD DISC ENGR 8/25/89
DESIGN 8/25/89
CHECKED A. VIRGO 8/25/89
DRAWN S. ELIA 8/25/89
DE-AC07-81NE44139 PROJECT NO.
19-CW-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

EBASCO SERVICES INCORPORATED
A/E C.F.S. NO. TASK ORDER 015
FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
HLW TRANSFER PIPING

SIZE	INDEX CODE NUMBER	DRAWING NO.	REV.
D		904D-060	19

SCALE AS NOTED
A/E SHEET NO. 904-D-060 SH.5 C



REV NO	DATE	REVISION	DR	CH	APPROVED		
B	~~[illegible]~~	~~GENERAL REVISION~~		AGS			
C	~~1-26-90~~	~~GENERAL REVISION AND AS PER EBAR 1325A~~	~~V.S.~~				
0	2/12/90	ER1775					
1	2-16-90	REV PER ECN 3475	GM	DRS			
2	2-22-90	REV. PER ECN 3485	CGR	DRS			
3	4-26-91	REV. PER ECN 4173	AAL				
4	5-14-91 5-23-91	REV. PER FCN VF-2A-247 FCN VF 2A-287	GW				
5	8-1-91	REV PER ECN 4443	GW				
6	8-5-92	REV/ECN 5420	PD				

NOTES:

1- FOR GENERAL NOTES SEE DWG. 905-D-710
2- SEE DWG. 904D-140 FOR KEY PLAN
3- FOR LINER EMBED LOCATIONS SEE DWG. 904D-129 & PNL-704-01 SH.1
4- FOR LINER SUPPORT SECTIONS & DETAILS SEE DWG 904-D-133.
5- FOR WALL PENETRATIONS SEE DWG PNL-704-01.
6- FOR COVERS SEE DRAWINGS 904-D-150 & 151.
7- FOR RISER DETAILS SEE DWG 904-D-061.
8- THE 8Q-1 VAULT TOP ELEVATION UNDER THE 8Q-1 PUMP PIT WALL VARY. THE PIT INVERT ELEV. SHALL BE MAINTAINED.
9- INVERT OF PIT SLOPES TO PIT DRAIN. SEE DWG 904D-061 FOR DRAIN ELEVATIONS
10- THE INSTALLATION OF HILTI-ADHESIVE ANCHORS SHALL BE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS RELOCATE DOWELS TO CLEAR HARDWARE: RE-BARS, PIPE, SLEEVES, ETC.. (± 3" IN BOTH DIRECTIONS)

THIS DRAWING IS PART OF CS-194 EXCEPT AS NOTED BELOW:

CS-139 ZONE (G8) AND RELATED DETAILS

REFERENCE DRAWINGS:

SMS-8Q-1 UTILITY PIT M&R PLAN & SECTIONS	900-D-2861
SMS-8Q-2 PUMP PIT M&R PLAN & SECTIONS	904-D-126
SMS-8Q-4 PUMP PIT M&R PLAN & SECTIONS	904-D-127
SMS-8Q-5 PUMP PIT M&R PLAN & SECTIONS	905-D-128
SMS TYP PIT COVER M&R PLAN & SECTIONS SH.1	904-D-150
SMS TYP PIT COVER M&R PLAN & SECTIONS SH.2	904-D-151
8Q-1 PUMP PIT LINER LAYOUT	PNL-704-01
SMS-8Q-1, 8Q-2, & 8Q-4 RISER FLANGES DETAILS	904-D-061
SMS-8Q-1 PUMP PIT LINER PLAN & SECTIONS	904-D-129
SMS PIT LINER SUPPORT TYP. SECT. & DET	904-D-133
V.F. GENERAL NOTES AND REFERENCE DWGS.	905-D-710
SMS KEY PLAN	904D-140

WVNS APPROVAL
COG. MGR. ______
COG. ENGR. ______
DRFT. SUPV. ______
Q.A. MGR. ______
R&S MGR. ______
PROJ. MGR. ______

FOR DRAWING INDEX SEE DRAWING NO. ______

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

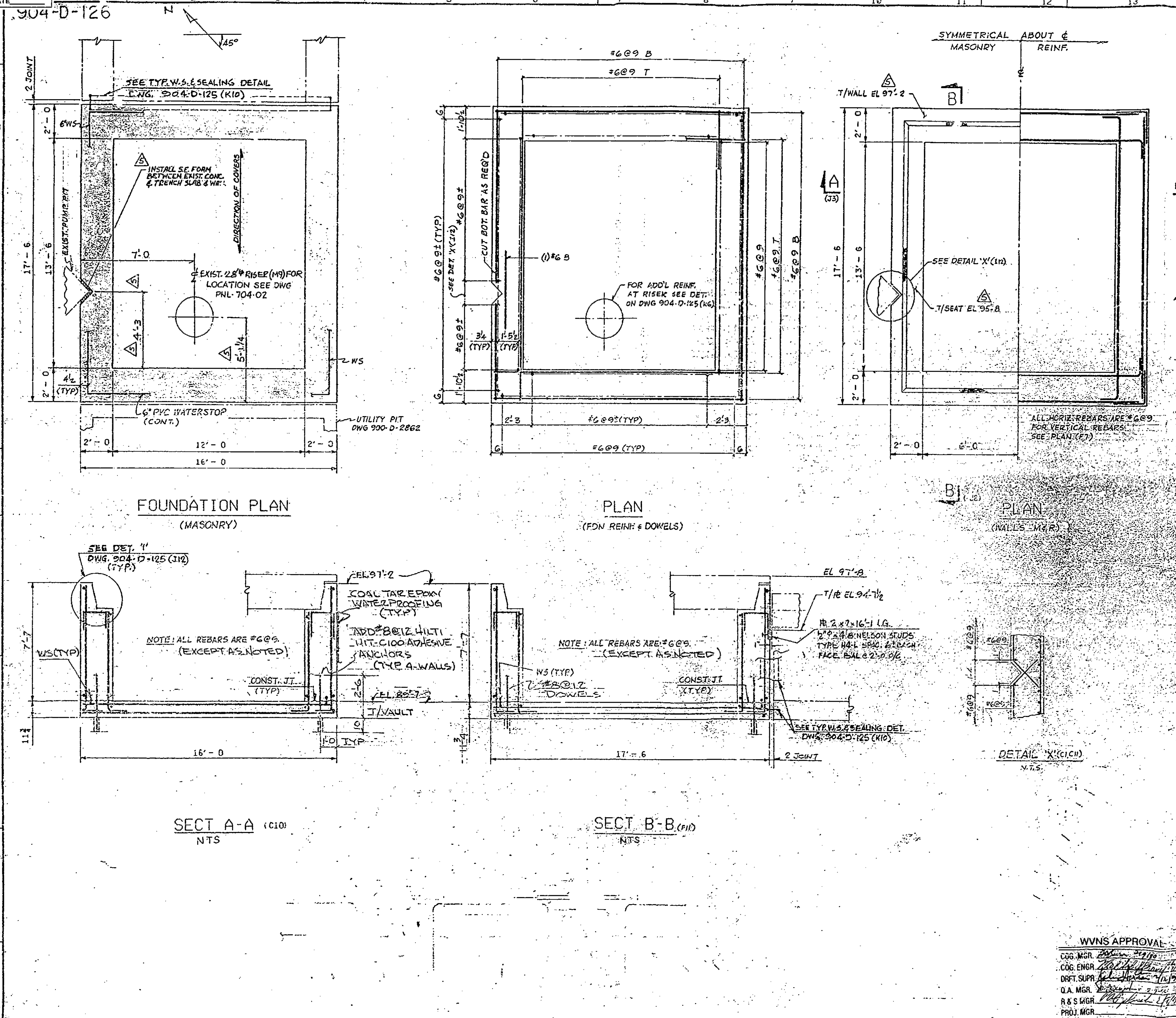
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
8Q-1 PUMP PIT M&R
PLAN & SECTION

APPRVD WVNS CO. | PROJECT MGR | ENGINEER SUPV | LEAD DISC ENGR | DESIGN 8-11-89 | CHECKED 8-11-89 | DRAWN S.M. GUARNIERI DATE 8-11-89

DE-AC07-81NE44139 PROJECT NO.
19-CUY-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

SIZE: D | INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG | DRAWING NO. 904D-125 | REV. 6
SCALE 3/8"=1'-0 | SPEC. CODES | A/E SHEET NO. 904-D-125 C

904-D-126



NO.	DATE	REVISION	DR	CH	APPROVED
~~B~~	~~10-13-89~~	~~GENERAL REVISION~~		AGS	
C	1-26-90	GENERAL REVISION AND AS PER EBAR 1325A	V.S.		
0	2/12/90	ER 1775			
1	2-16-90	REV. PER ECN 3475	GM	DRS	
2	2-22-90	REV. PER ECN 3483	CGR	DRS	
3	10/31/90	REV PER FCN VF-2A-056	LRK	HAB	
4	4/26/90	REV PER ECN-4173	AAJ	HAB	
5	5-14-91	REV. PER FCN VF-2A-247	GW	HAB	

NOTES:

1. FOR GENERAL NOTES SEE DWG. 905-D-710
2. SEE DWG. 904D-140 FOR KEY PLAN
3. FOR LINER EMBED LOCATIONS SEE DWG 904D-130 & PNL-704-01 SH.2
4. FOR LINER SUPPORT SECTIONS & DETAILS SEE DWG. 904-D-133.
5. FOR WALL PENETRATIONS SEE DWG PNL-704-02.
6. FOR COVERS SEE DRAWINGS 904-D-150 & 151.
7. FOR RISER DETAILS SEE DWG 904-D-061.
8. THE 8D-2 VAULT TOP ELEVATION UNDER THE 8Q-2 PUMP PIT WILL VARY. THE PIT INVERT ELEVATION SHALL BE MAINTAINED.
9. INVERT OF PIT SLOPES TO PIT DRAIN. SEE DWG 904D-061 FOR DRAIN ELEVATIONS.
10. THE INSTALLATION OF HILTI ADHESIVE ANCHORS SHALL BE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS. RELOCATE DOWELS TO CLEAR HARD[illegible] : REBARS, PIPE, SLEEVES, ETC [illegible] BOTH DIRECTIONS)

REFERENCE DRAWINGS:

SMS-8Q-2 UTILITY PIT M&R - PLAN & SECTIONS	900-D-2862
SMS-8Q-1 PUMP PIT M&R - PLAN & SECTIONS	904-D-125
8Q-2 PUMP PIT LINER LAYOUT	PNL-704-02
SMS-8Q-1, 8Q-2 & 8Q-4 RISER FLANGE DETAILS	904-D-061
V.F. GENERAL NOTES AND REFERENCE DWGS.	905-D-710
SMS-8Q-2 PUMP PIT LINER PLAN AND SECT.	904-D-130
SMS PIT LINER SUPPORT TYP. SECT. & DET.	904-D-133
SMS TYP. PIT COVER M&R PLAN & SECT. SH. 1 & 2	904-D-150 & 151
SMS KEY PLAN	904D-140

FOR DRAWING INDEX SEE DRAWING NO. ______

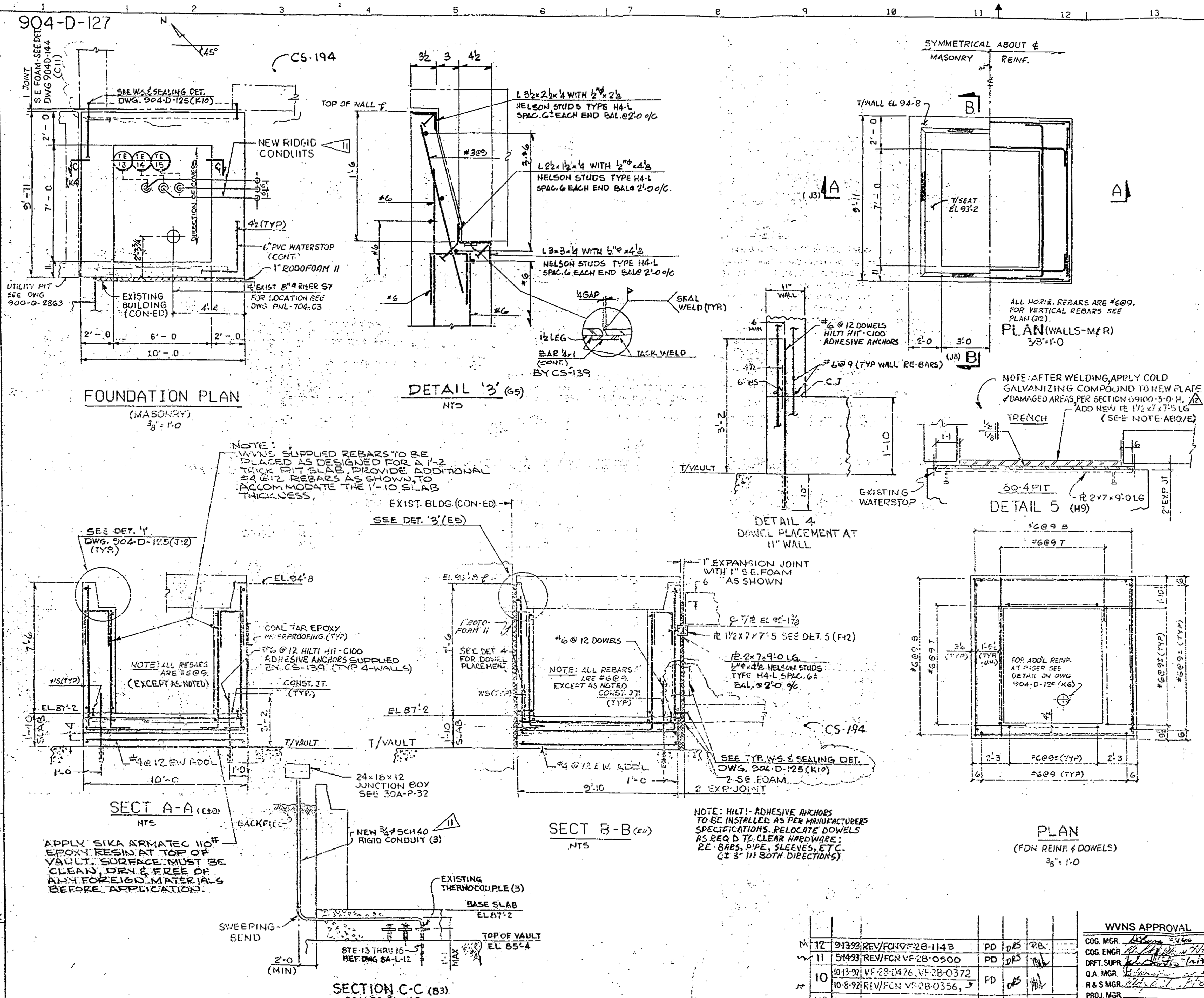
WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

APPRVD WVNS CO.
PROJECT MGR
ENGINEER SUPV.
LEAD DISC. ENGR
DESIGN
CHECKED D. BUSNIOC
DRAWN S. H. GIRONIERI DATE 8-11-89
DE-AC07-81NE44139 PROJECT NO.
19-CWV-22275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
8Q-2 PUMP PIT M&R
PLAN & SECTION

SIZE D | INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG | DRAWING NO. 904D-126 | REV. 5
SCALE 3/8" = 1'-0" | SPEC. CODES | A/E SHEET NO. 904-D-126 C

904-D-127



NO.	DATE	REVISION	DR	CH	APPROVED
B	10-13-89	GENERAL REVISION			
C	1-26-90	GENERAL REVISION AND AS PER EBASCO 1225A	V.S.		
0	2/12/90	ER 1775			
1	2-16-90	REV. PER ECN 3475	CM	DRS	
2	2-22-90	REV. PER ECN 3483	CGR	DRS	
3	11-1-90	REV. PER FCN VF-2A-057	CM	HAB	
4	2-5-91	REV. PER FCN VF-2A-078	CW	HAB	
5	8-2-91	REV. PER ECN 4443	GW	DRS	
6	6-1-92	GEN. REV. PER ECN 5062	AAJ	DRS	
7	8-5-92	REV/ECN 5420 REV/ECN 5434 REV/ECN 5432	PD DRS DRS	HB	
8	8-24-92	REV/ECN 5456		DRS	
9	9-21-92	REV/ECN 5524	PD	HB	

NOTES:

1. FOR GENERAL NOTES SEE DRAWING 905-D-710
2. SEE DWG. 904D-140 FOR KEY PLAN
3. FOR LINER EMBED LOCATIONS SEE DWG. 904D-131 & PNL-704-01 & 1.3
4. FOR LINER SUPPORTS SECTIONS & DETAILS SEE DWG 904-D-133.
5. FOR WALL PENETRATIONS SEE DWG PNL-704-03.
6. FOR COVERS SEE DRAWINGS 904-D-150 & 151.
7. FOR RISER DETAILS SEE DWG 904-D-061.
8. THE 8D-3/4 VAULT TOP ELEVATION UNDER 8Q-1 PUMP PIT WILL VARY. THE PIT INVERT ELEV. SHALL BE MAINTAINED.
9. INVERT OF PIT SLOPES TO PIT DRAIN. SEE DWG. 904D-061 FOR DRAIN ELEVATION.
10. NEW VAULT PLUG TO BE INSTALLED IN PLACE BY WVNS PRIOR TO PLACEMENT OF PUMP PIT CONCRETE. SEE DWG. 900D-2863
11. WORK PROCEDURE FOR WVNS APPROVAL IS REQUIRED PRIOR TO REPLACING THESE CONDUIT.

THIS DRAWING IS PART OF CS-139 EXCEPT AS NOTED BELOW:

CS-194, ZONE A4, H10 WVNS SUPPLIED MATERIALS, ALL RE-BAR AND EMBEDS EXCEPT AS NOTED

REFERENCE DRAWINGS:

SMS-8Q-4 UTILITY PIT M&R PLAN & SECT'S	900-D-2863
SMS-8Q-1 PUMP PIT M&R PLAN & SECTIONS	904-D-125
8Q-4 PUMP PIT LINER LAYOUT	PNL-704-03
V.F. GENERAL NOTES AND REF DRAWINGS	905-D-710
SMS 8Q-1, 8Q-2, AND 8Q-4 RISER FLANGE DETS.	904-D-061
SMS 8Q-4 PUMP PIT LINER PLAN AND SECT.	904-D-131
SMS PIT LINER SUPPORT TYP SECT. & DETAILS	904-D-133
SMS TYP PIT COVER M&R PLAN & SECT. SH. 1 & 2	904-D-150 & 151
SMS KEY PLAN	904D-140

FOR DRAWING INDEX SEE DRAWING NO.

NO	DATE	REVISION	DR	CK	APV	APV
12	9-13-93	REV/FCN VF-28-1143	PD	DRS		
11	5-14-93	REV/FCN VF-28-0500	PD	DRS		
10	10-13-92 / 10-8-92	VF-28-0476, VF-28-0372 / REV/FCN VF-28-0356	PD	DRS		

WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

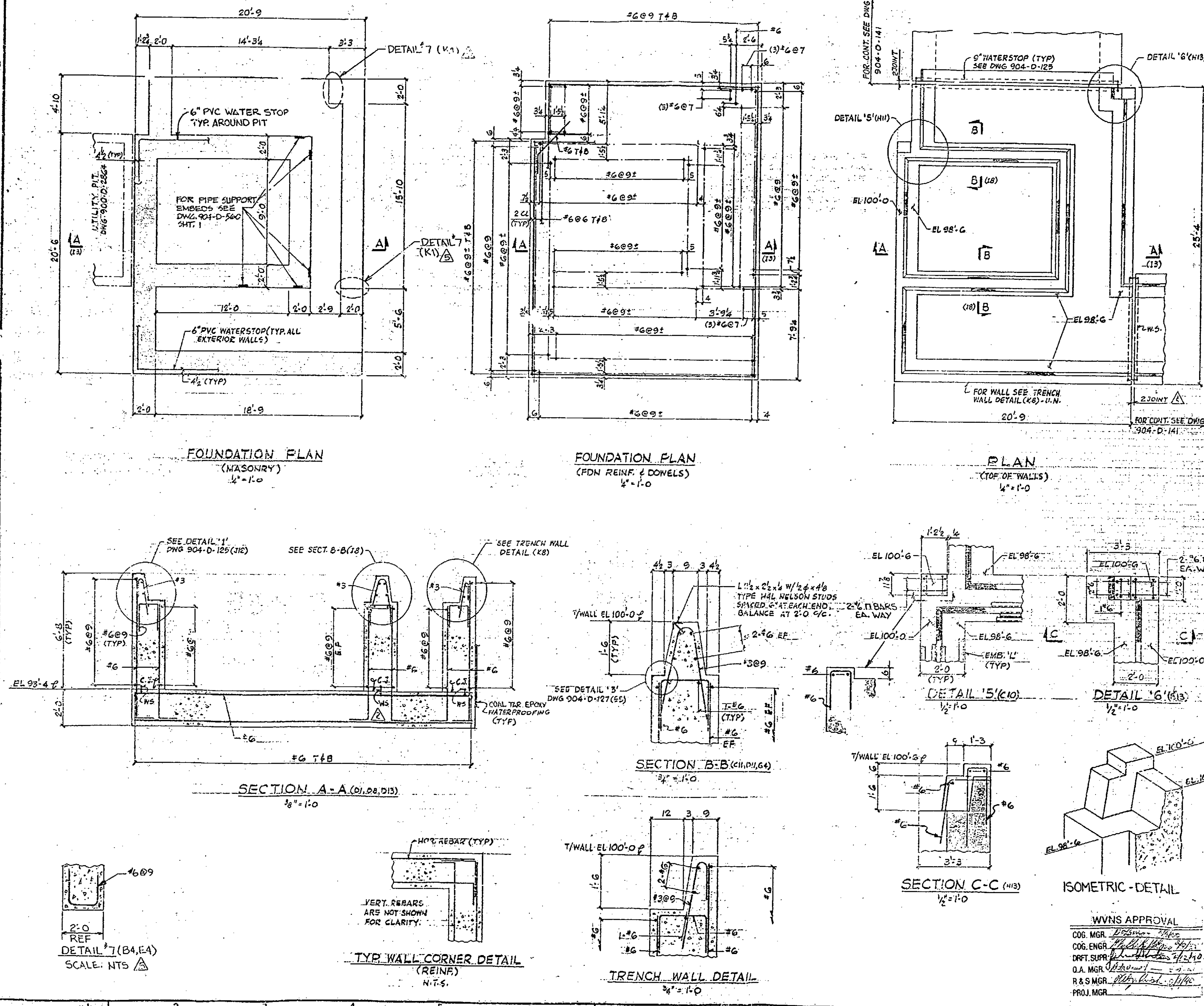
EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 815
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
8Q-4 PUMP PIT M&R
PLAN & SECTION

SIZE D
DRAWING NO. 904D-127
REV. 12
A/E SHEET NO. 904-D-127 C
SCALE AS NOTED
ISSUED FOR CONSTRUCTION

904-D-128

REV NO	DATE	REVISION	DR	CH	APPROVED
C	1-26-90	REVISED PER EBAR NC13754 REVISED & REDRAWN	VS		
0	2/12/90	ER 1775			
1	2-16-90	REV. PER ECN 3475	GM	DRS	
2	2-22-90	REV. PER ECN 3483	CGR	DRS	
3	10-11-90	REV. PER ECN 3636	CCR	HAB	
4	11-13-90	PER FCN VF-2A-064	JLH	DRS	
5	4/4/91	PER FCN VF-2A-203	TLH	HAB	



NOTES:

1. FOR GENERAL NOTES SEE DRAWING 905-D-710.
2. SEE DWG 904D-140 FOR KEY PLAN
3. FOR LINER EMBED. LOCATIONS SEE DWG. 904D-132 & PNL-704-01 SH4
4. FOR LINER SUPPORT SECTION & DETAILS SEE DWG 904-D-133.
5. FOR WALL PENETRATIONS SEE DRAWING PNL-704-04.
6. FOR COVERS SEE DRAWINGS 904-D-150 & 151.

REFERENCE DRAWINGS:

SMS - 8Q-1 PUMP PIT PLANS & SECTIONS - M&R	904-D-125
SMS - TRENCH PLAN & DETAILS - SH 1	904-D-141
SMS - 8Q-4 PUMP PIT PLANS & SECTIONS - M&R	904-D-127
SMS - 8Q-5 UTILITY PIT PLAN & SECTIONS - M&R	900-D-2864
SMS - HLW TRANSFER PIPING SUPPORT LOCATIONS	904-D-560
V.F. GENERAL NOTES AND REFERENCE DWGS.	905-D-710
PUMP PIT LINER LAYOUT 8Q-5	PNL-704-04
SMS 8Q-5 PUMP PIT LINER PLAN & SECTION	904-D-132
SMS PIT LINER SUPPORT TYP. SECT. & DET.	904-D-133
SMS TYP. PIT COVER M&R PLAN & SECT. SHT. 1 & 2	904-D-150 & 151
SMS KEY PLAN	904D-140

WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

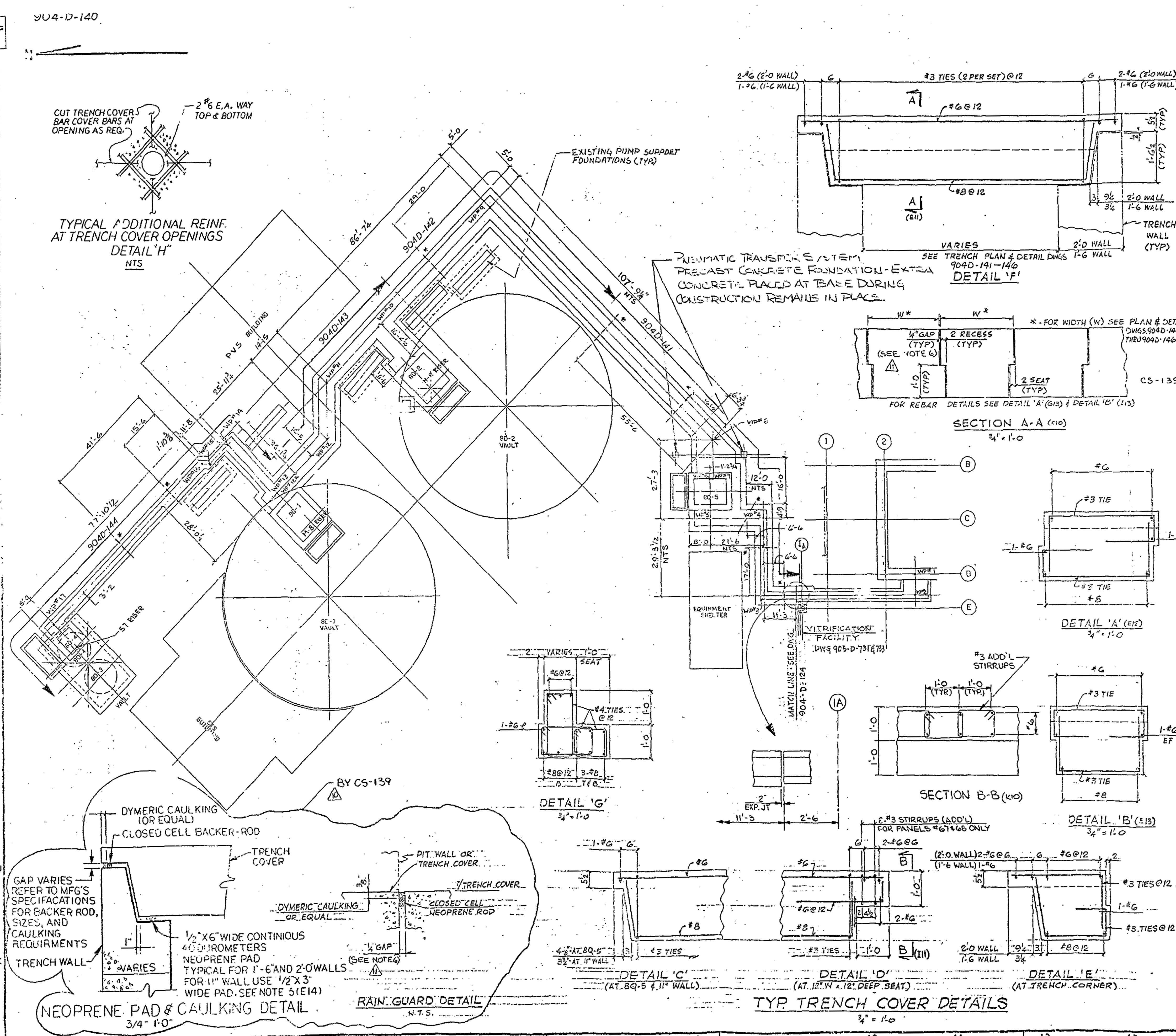
APPRVD WVNS CO.
PROJECT MGR 1/26/90
ENGINEER SUPV 1/26/90
LEAD DISC ENGR 1/26/90
DESIGN 1/26/90
CHECKED 1-18-90
DRAWN V. SEKERKA DATE 1-18-90
DE-AC07-81NE44139 PROJECT NO.
19-CUY-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2385 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
8Q-5 DIVERSION PIT M&R
PLANS & SECTIONS

SIZE D | INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG | DRAWING NO. 904D-128 | REV. 5
SCALE NONE | SPEC. CODES | A/E SHEET NO. 904-D-128 C

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

904-D-140



NO	DATE	REVISION	BY	CH	APPROVED
B	10-13-89	GENERAL REVISION	V.S.	SC	
C	2-2-90	REVISED PER EBAR No. 1338A	V.S.	SC	
0	2/12/90	ER 1775			
1	2-16-90	GEN REV PER ECN 3474 & 3474A	GW	KMG DLS	
2	4-9-90	REV PER ECN 3569	JAW		
3	10-15-90	REV. PER ECN 3636 & FCN VF-2A-004	CGR	HAB	
4	10-31-90	REV. PER: FCN VF-2A-010	LH	HAB	
5	11-8-90	REV. PER FCN VF-2A-032	DAK	DRS	
6	2-4-91	REV PER FCN VF-2A-111	DAK	HAB	
7	2-19-91	REV PER FCN VF-2A-099 & VF-2A-098	GM	HAB	
8	12-26-91	ECN 4766	PD	HAB	
9	[illegible]	GEN REV PER ECN 5297	HB	DRS	
10	[illegible]-2-93	REV PER ECN 6279	GW	HAB	
11	9-16-94	REV PER FCN VF-26-2588	WCK		

* NOTE: 6" CAPPED SCH 40 PVC PIPE INSTALLED UNDER MUDMAT FOR FUTURE ACCESS UNDER TRENCH

GENERAL NOTES:

1. FOR GENERAL NOTES EXCEPT AS SHOWN BELOW SEE DRAWING 905-D-710
2. FOR W.P. GEOMETRY SEE DRAWING 900D-2960
3. WORK THIS DRAWING WITH DRAWINGS 904-D-141 THRU 904-D-146 AND DWG 900D-2960
4. ALL CARBON STEEL EMBEDS TO BE GALVANIZED AFTER WELDING PRIOR TO INSTALLATION.
5. UNLESS OTHERWISE NOTED: PRECAST CONCRETE COVERS SHALL HAVE ONLY 2 BEARING SURFACES WHICH SHALL BE EITHER THE TRENCH WALLS OR A SUPPORT BEAM, AND THE BEARING SURFACES SHALL BE OPPOSITE EACH OTHER. REDUCE THE THICKNESS OF THE COVER BY 1/4 INCH AT THE NON-BEARING CONTACT AREA.

   ALL BEARING SURFACES SHALL HAVE A 1/2" NEOPRENE (40 DUROMETERS) BEARING PAD, CONTINUOUS FOR THE ENTIRE BEARING SURFACE. THE PAD THICKNESS HAS NOT BEEN INCORPORATED INTO THE COVER ELEVATIONS.

CS-139

GENERAL NOTES CONTINUED BELOW.

REFERENCE DRAWING

VITRIFICATION FACILITY GENERAL NOTES AND REFERENCE DRAWINGS	905D-710
VIT. FAC. ARCHITECTURAL ELEVATION	905D-731 SH.1
VIT. FAC. ARCHITECTURAL GROUND FLOOR EL. 100FT 0	905D-733
SMS TRENCH PLAN & DET M&R SH. 1-4	904D-141 THRU 904D-144
SMS TRENCH COVER SCHEDULE SH. 1&2	904D-145 THRU 904D-146
℄ SMS TRENCH	900D-2960
STS SGN SAMPLE PNEUMATIC TRANSFER SYSTEM	900D-1211

WVNS APPROVAL

COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

GENERAL NOTES (CONTINUED FROM ABOVE)

6. SPACING BETWEEN TRENCH COVERS TO BE 1/4 INCH A TOLERANCE OF MINUS 1/16" TO PLUS 1/8" IS ALLOWABLE TO PERMIT FIT UP ONLY. WVNS ENGINEERING TO BE NOTIFIED OF ANY DISCREPANCIES.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/E O.F.C. NO. 2308 TASK ORDER 015

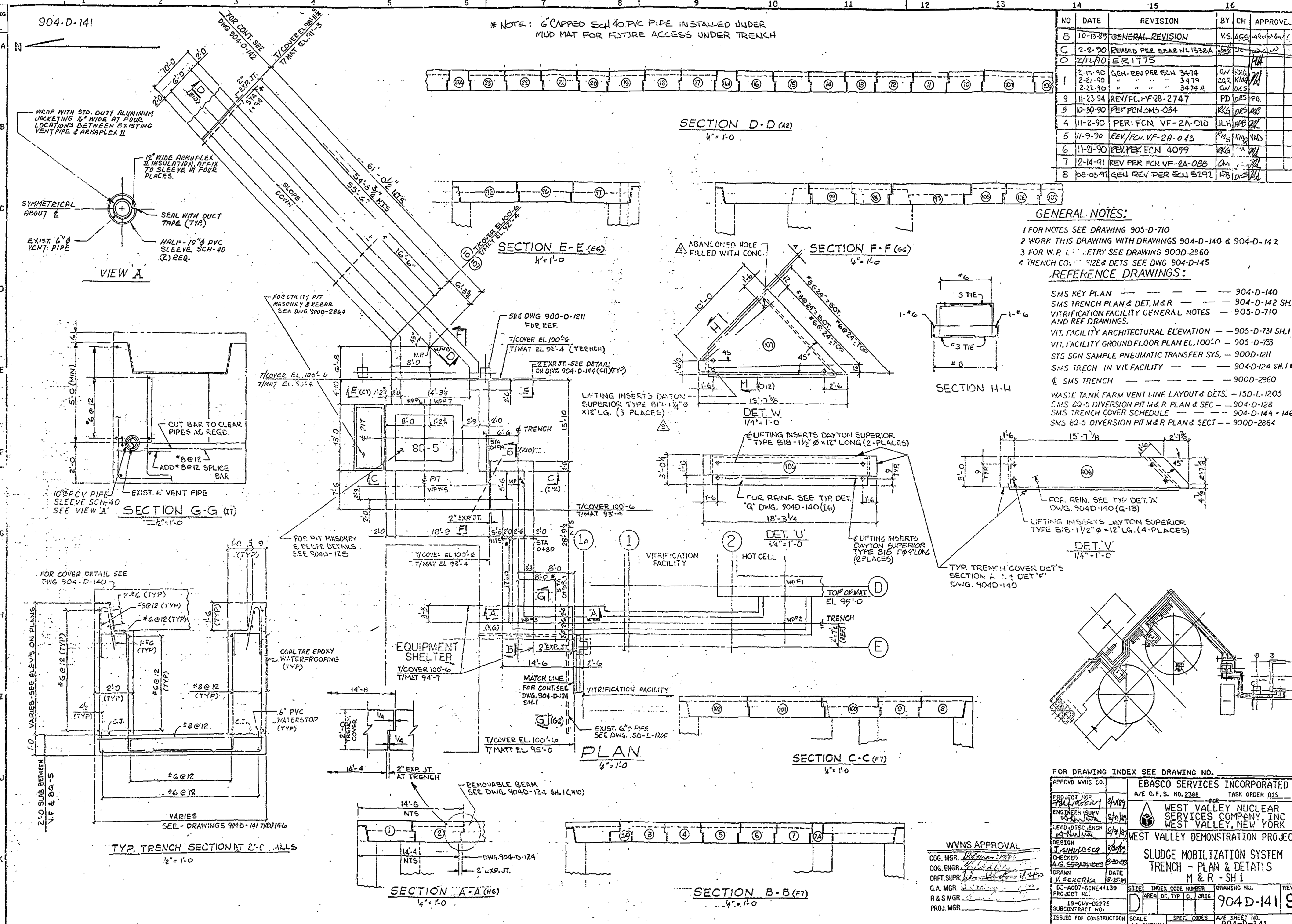
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

SLUDGE MOBILIZATION SYSTEM
KEY PLAN

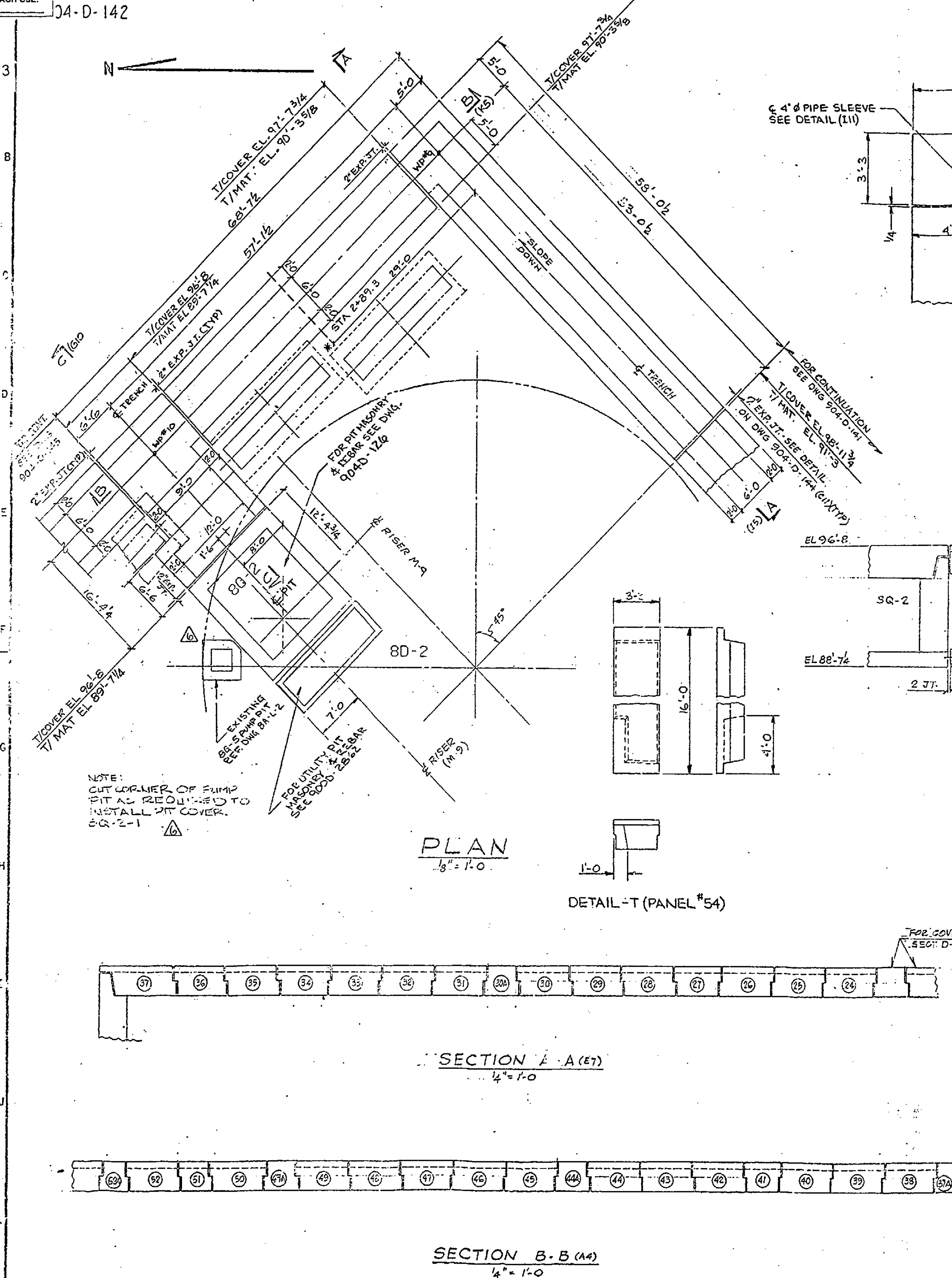
DESIGN J. SIMULESCU
CHECKED S. CASUBA
DRAWN V. SEKERKA
PROJECT NO. DE-AC07-81NE44139
SUBCONTRACT NO. 18-CW-02275
ISSUED FOR CONSTRUCTION
SIZE D
SCALE 1/16"=1'-0
DRAWING NO. 904D-140
REV. 11
A/E SHEET NO. 904-D-140

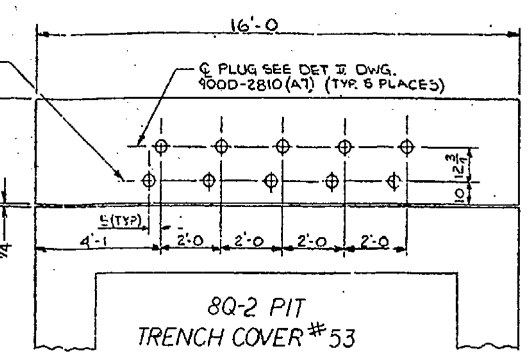
VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_____ DATE_____



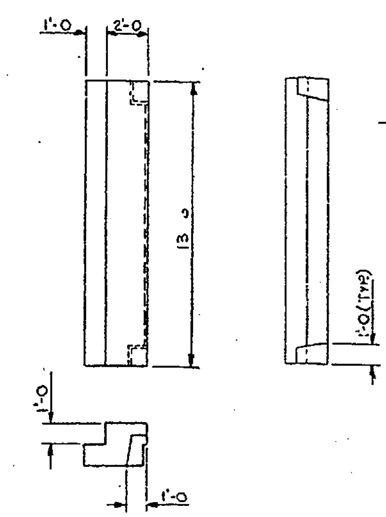
VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT_______ DATE_______

904-D-142

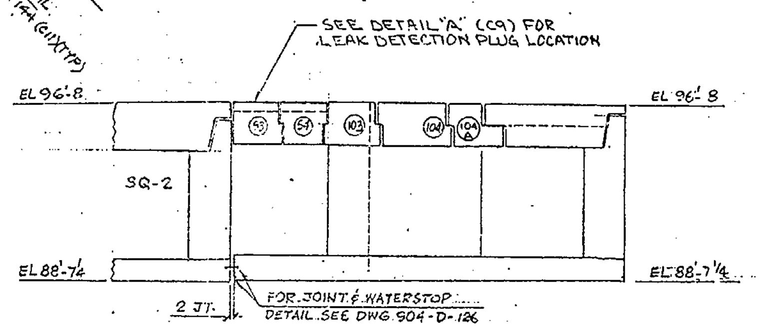




DETAIL "A"
LEAK DETECTION PLUG
SCALE: 3/8" = 1'-0

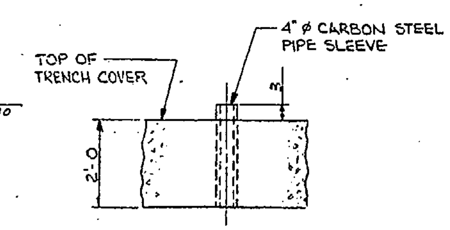


DETAIL-S (PANEL #104A)



SECTION C-C (D1)
NTS

DETAIL-T (PANEL #54)



TYPICAL DETAIL
4" ø EMBEDDED PIPE SLEEVE
THRU TRENCH COVER
NTS

NO	DATE	REVISION	BY	CH	APPROVED
B	10-13-89	~~GENERAL REVISION~~	V.S.	AGS	
C	2-2-90	REVISED PER EBAR No 1338 A			
O	2/12/90	ER1775			
1	2-20-90 2-22-90	GEN REV PER ECN 3474, & 3477 " " " " 3474 A	GW	KMQ	
2	10-15-90	PER ECN 3636 & FCN VF-2A-004	CGR	HAB	
3	10-30-90	REV PER FCN SMS-034	RKG	DRS	
4	5-14-91	REV PER FCN VF-2A-?47, 217	GW	HAB	
5	08-03-92	REV PER ECN 5292	HB	DRS	
6	4-6-94	REV/FCN VF-2B-1712	KGZ		MEM

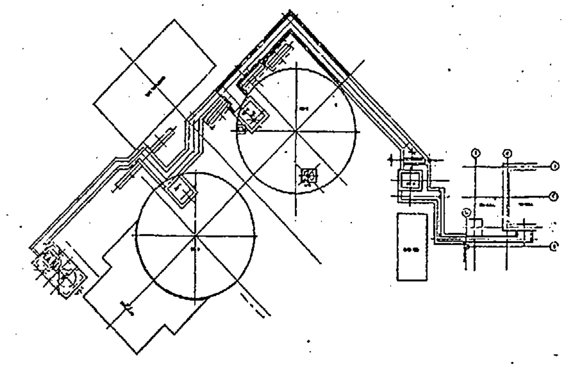
GENERAL NOTES:

1. FOR NOTES SEE DRAWING — 905-D-710
2. FOR W.P. GEOMETRY SEE DRAWING — 900D-2960
3. WORK THIS DRAWING WITH DRAWINGS — 904-D-140, 141, & 143
4. FOR TRENCH COVER SIZES SEE DRAWING — 904-D-145

REFERENCE DRAWINGS:

VITRIFICATION FACILITY GENERAL NOTES AND REF. DWG'S. — 905-D-710
SMS 8Q-2 PUMP PIT M & R PLAN & SECTION — 904-D-125
SMS KEY PLAN — 904-D-140
SMS TRENCH PLAN & DET. M & R — 904-D-141 SH.1,3,& 4; 904-D-143 & 144
PIPING ARRANGEMENT WASTE STORAGE TANKS 8D 1 & 8D 2 PLAN-UTILITY PIPING — 8A-L-2
℄ SMS TRENCH — 900D-2960
SMS 8Q-4, 8Q-5 PIT COVER VALVE ACCESS PENETRATIONS — 900D-2810

* NOTE: 6" CAPPED SCH 40 PVC PIPE INSTALLED UNDER MUD MAT FOR FUTURE ACCESS UNDER TRENCH

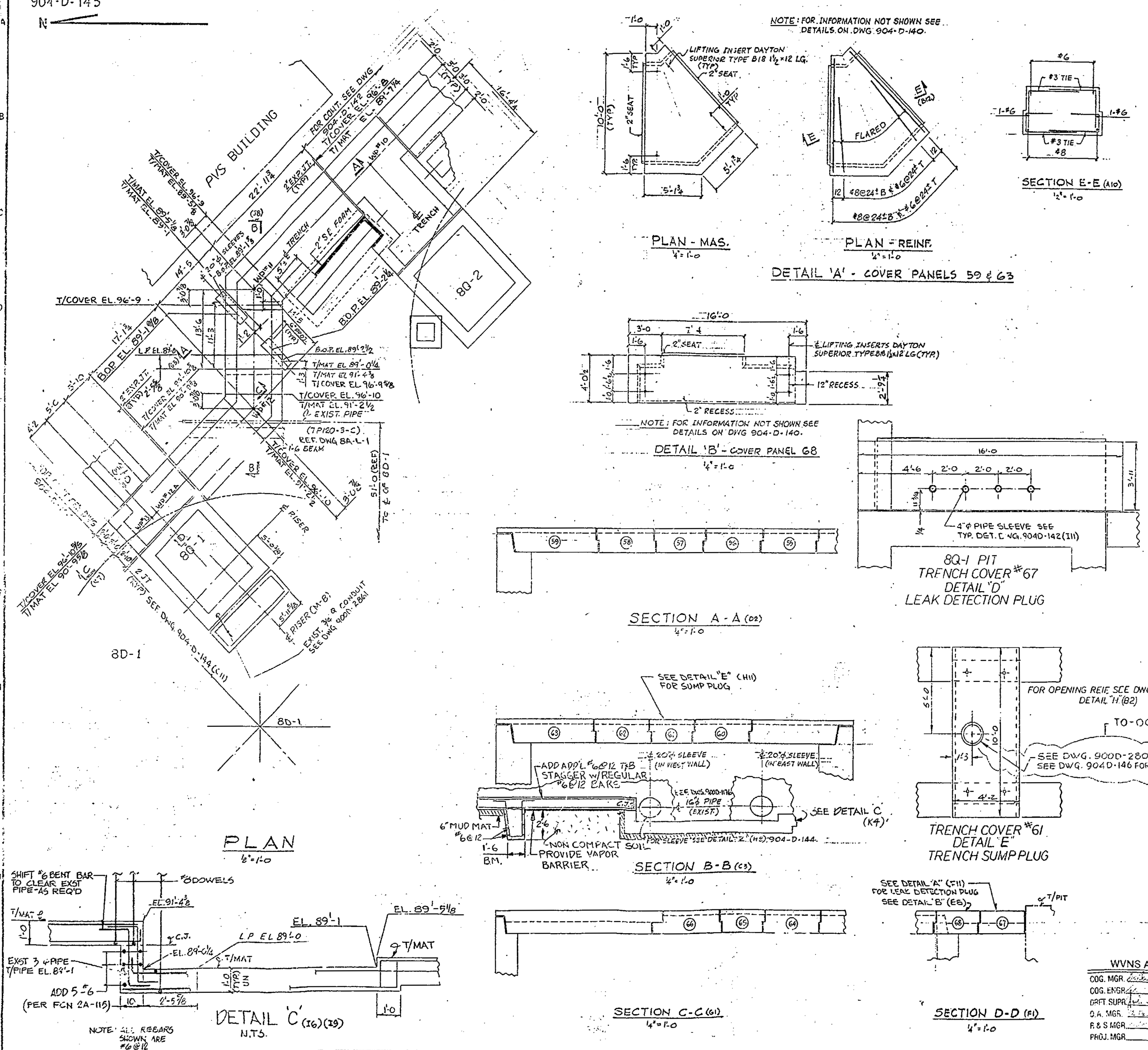


WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

APPRVD WVNS CO.		EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2386 TASK ORDER 015 FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK WEST VALLEY DEMONSTRATION PROJECT
PROJECT MGR	8/31/89	
ENGINEER, SUPV	8/31/89	
LEAD DISC ENGR	8/31/89	
DESIGN J. SIMULESCU	8/31/89	SLUDGE MOBILIZATION SYSTEM TRENCH - PLAN & DETAILS M & R - SH 2
CHECKED A.G. SERAPHIDES	8-30-89	
DRAWN V. SEKERKA	DATE 8-25-89	
DE-AC07-81NE44139 PROJECT NO.		SIZE D; INDEX CODE NUMBER (AREA, DR. TYP, CL, ORIG); DRAWING NO. 904D-142; REV. 6
19-CWV-02275 SUBCONTRACT NO.		
ISSUED FOR CONSTRUCTION		SCALE AS SHOWN; SPEC. CODES; A/E SHEET NO. 904-D-142

904-D-143



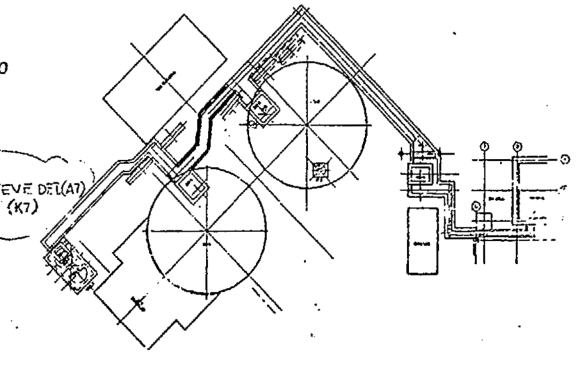
NO	DATE	REVISION	BY	CH	APPROVAL
B	10-13-89	~~GENERAL REVISION~~	V.S.	SC	
C		~~REVISED PER EBAR No. 1338A~~	V.S.	SC	
0	2/12/90	ER 1775			
1	2-19-90	GEN REV PER ECN 3474 & 3477 3474 A	GW	KMQ	
2	10-16-90	PER ECN 3636 & FCN VF-2A-004	CGR	HAB	
3	10-30-90	REV PER FCN SMS-034	RKG	DRS	
4	11-8-90	REV PER FCN VF-2A-032	DAK	DRS	
5	11-16-90	REV PER FCN VF-2A-050	RKG	KMQ	
6	11-26-90	PER FCN VF-2A-067	JCH	HAB	
7	11-28-90	REV PER ECN 4059	RKG	HAB	
8	1-31-91	REV/FCN VF-2A-069	RMS	HAB	
9	2-6-91	REV/FCN VF-2A-133	RMS	HAB	
10	2-14-91	REV PER FCN VF-2A-126	GM	HAB	
11	3-7-91	REV. PER FCN VF-2A-027 VF-2A-115	GW	HAB	
12	5-15-91	REV. PER FCN VF-2A-247, VF-2A-258, VF-2A-217	GW	HAB	
13	3-3-95	REV/FCN-TM-0028	PD	CLS	P.B.

GENERAL NOTES:

1 FOR NOTES SEE DRAWING — — — 905-D-710
2 FOR W.P. GEOMETRY SEE DRAWING — — 900D-2960
3 WORK THIS DRAWING WITH DRAWINGS — 904-D-140, 141, 142 & 144
4 FOR TRENCH COVER SIZES & DETS. SEE 904-D-145

REFERENCE DRAWINGS:

VITRIFICATION FACILITY GENERAL NOTES AND REFERENCE DRAWINGS — 905-D-710
SMS KEY PLAN — — — — — 904-D-140
℄ SMS TRENCH — — — — 900D-2960
SMS TRENCH PLAN & DET. M&R — — 904-D-141 SH. 1-4, 142, & 144
TANK FARM VENTILATION TANKS 8D-1 & 8D-2 — 900D-1176
VENTILATION PIPING & SERVICE BUILDING
PIPING ARRANGEMENT WASTE STORAGE — 8A-L-1
TANK 8D-1 & 8D-2 PLAN - PROCESS PIPING
SMS 8Q-4, 8Q-5 PIT COVER ACCESS PENETRATIONS — — 900D-2810

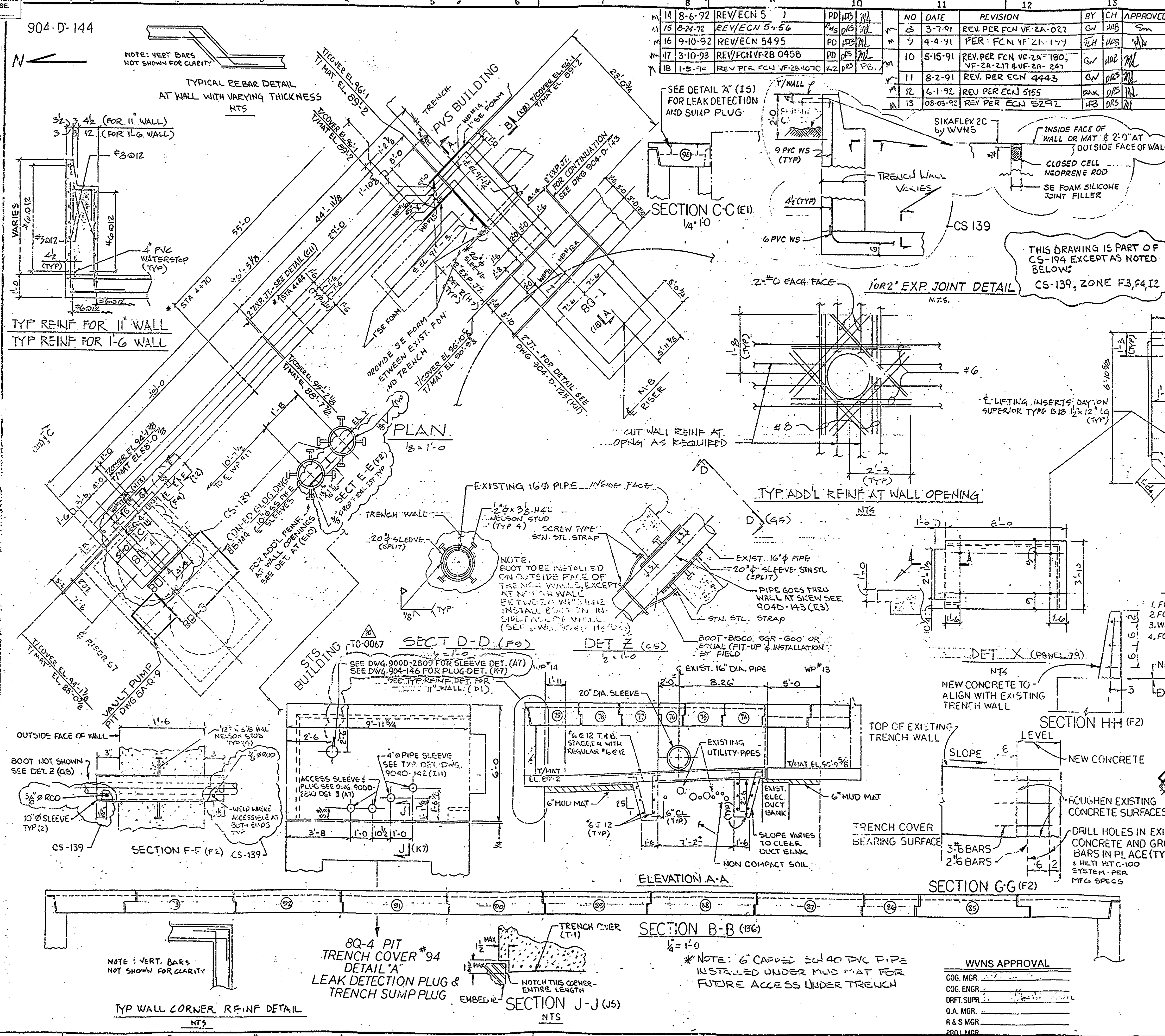


WVNS APPROVAL
COG. MGR.
COG. ENGR.
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

APPRVD CO.		EBASCO SERVICES INCORPORATED A/E O.F.S. NO. 2388 TASK ORDER C15 FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
PROJECT MGR	8/31/89	
ENGINEER SUPV	8/31/89	
LEAD DISC ENGR	8/31/89	WEST VALLEY DEMONSTRATION PROJECT
DESIGN J. SIMULESCU	8/30/89	SLUDGE MOBILIZATION SYSTEM TRENCH - PLAN & DETAILS M & R - SH 3
CHECKED S. Casuba	8-30-89	
DRAWN V. SEKERKA	DATE 8-25-89	
DE-AC07-81NE44139 PROJECT NO.	SIZE D; INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG	DRAWING NO. 904D-143; REV 13
19-CWV-02275 SUBCONTRACT NO.		
ISSUED FOR CONSTRUCTION	SCALE 1/8"=1'-0; SPEC. CODES	A/E SHEET NO. 904-D-143

904-D-144



NO	DATE	REVISION	BY	CH	APPROVED
14	8-6-92	REV/ECN 5	PD	HAB	
15	8-24-92	REV/ECN 5456	RMS	DRS	
16	9-10-92	REV/ECN 5495	PD	HAB	
17	3-10-93	REV/FCN VF-2B 0458	PD	DRS	
18	1-5-94	REV PER FCN VF-2B-1070	KZ	DRS	PB.

NO	DATE	REVISION	BY	CH	APPROVED
8	3-7-91	REV. PER FCN VF-2A-027	GW	HAB	
9	4-4-91	PER: FCN VF-2A-199	JCH	HAB	
10	5-15-91	REV. PER FCN VF-2A-180, VF-2A-217 & VF-2A-247	GW	HAB	
11	8-2-91	REV. PER ECN 4443	GW	DRS	
12	6-1-92	REV PER ECN 5155	DAK	DRS	
13	08-03-92	REV PER ECN 5292	HAB	DRS	

NO	DATE	REVISION	BY	CH	APPROVED
B	10-19-89	GENERAL REVISION	V.S.	SC	
C		REVISED PER EGAR 1338 A	DB	SC	
0	2/12/90	ER 1775			
19	1-24-94	REV PER FCN VF-2B-1595	GW	DRS	PB.
20	3-3-95	REV/FCN-TM-0028	PL		PB.
3	10-31-90	REV PER FCN SMS-034	RKG	DRS	
4	11-8-90	REV PER FCN VF-2A-032	DAK	DRS	
5	11-21-90	REV PER ECN 4059	RKG	HAB	
6	2-4-91	REV/FCN VF-2A-133	RMS	HAB	
7	2-13-91	REV PER FCN VF-2A-111	DAK	HAB	

(CONT)

REFERENCE DRAWINGS:

- SMS 8Q-4, 8Q-5 PIT COVER VALVE PENETRATIONS — 900D-2810
- ℄ SMS TRENCH — 900D-2960
- PIPING ARRANGEMENT WASTE STORAGE TANKS 8D-1 & 8D-2 PLAN UTILITY PIPING — 8A-L-2
- VITRIFICATION FACILITY GEN. NOTES AND REF DWGS. — 905-D-710
- SMS KEY PLAN — 904-D-140
- SMS TRENCH PLAN & DET. M&R — 904-D-143
- SMS 8Q-1 PUMP PIT M&R PLAN & SECT. — 904-D-125
- SMS TRENCH IN V.F. — 904-D-124

GENERAL NOTES:

1. FOR NOTES SEE DRAWING — 905-D-710
2. FOR W.P. GEOMETRY SEE DRAWING — 900D-2960
3. WORK THIS DRAWING WITH DRAWINGS — 904-D-140, & 143
4. FOR TRENCH COVER SIZES & DETS. SEE — 904-D-145

FOR DRAWING INDEX SEE DRAWING NO. ______

APPRVD WVNS CO.	
PROJECT MGR	8/31/89
ENGINEER SUPV	8/31/89
LEAD DISC ENGR	8/31/89
DESIGN J. SIMULESCU	8/30/89
CHECKED	8-30-89
DRAWN V. SEKERKA	DATE 8-25-89
DE-AC07-81NE44139 PROJECT NO.	
19-CWV-02275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 015
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

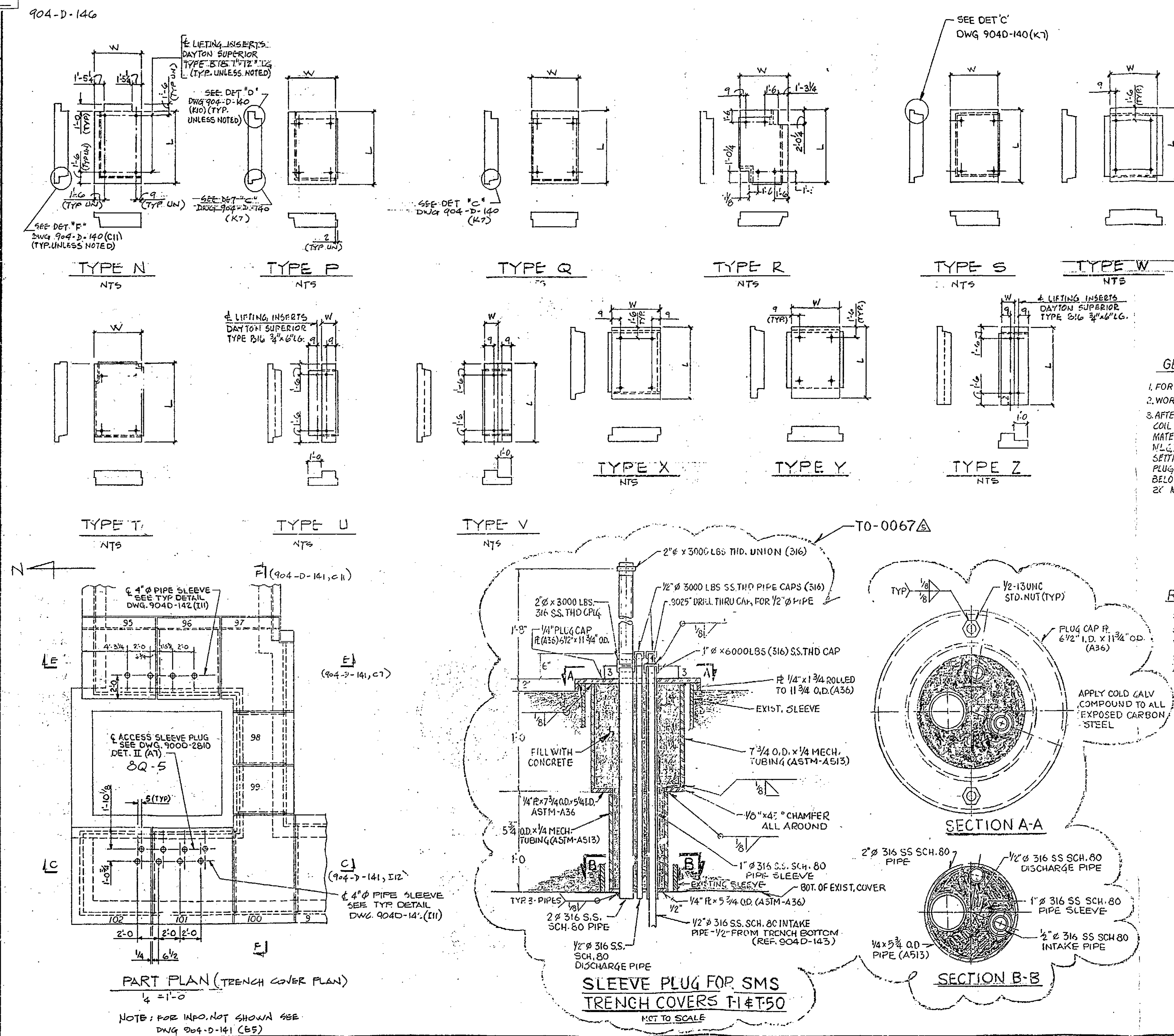
SLUDGE MOBILIZATION SYSTEM
TRENCH - PLAN & DETAILS
M & R - SH4

SIZE	INDEX CODE NUMBER AREA	DR. TYP	CL	ORIG	DRAWING NO.	REV
D					904D-144	20

SCALE: AS SHOWN | SPEC. CODES: | A/E SHEET NO. 904-D-144

WVNS APPROVAL	
COG. MGR.	
COG. ENGR.	
DRFT. SUPR.	
Q.A. MGR.	
R & S MGR.	
PROJ. MGR.	

904-D-146



REV NO	DATE	REVISION	DR	CH	APPROVED
~~B~~	~~2-2-90~~	~~REVISED PER EEAR Nº 1975~~			
0	2/12/90	ER1775			
1	2-21-90 2-23-90	REV. PER ECN 3479 & ECN 3479A	GW CGR	KMO KMQ	
2	10-17-90	PER ECN 3636 & FCN VF-2A-004	CGR	HAB	
3	2-14-91	REV PER FCN VF-2A-088	GM	HAB	
4	9-14-94	REV PER FCN VF-2A-2551	MJC	NPA	P.B.
5	3-3-95	REV/ FCN-TM-0028	PD		P.B.

GENERAL NOTES:

1. FOR GENERAL NOTES SEE DRAWING — 905D-710
2. WORK THIS DRAWING WITH DRAWINGS — 905D-140 THRU 144
3. AFTER TRENCH COVERS & PIT COVER ARE INSTALLED IN PLACE, ALL COIL & INSERT HOLES ARE TO BE DRIED & CLEANED OF ANY LOOSE MATERIAL. COAT ENTIRE HOLE WITH CHEVRON DURA-LITH GREASE - NLGI #2. PLUG EACH HOLE WITH DAYTON-SUPERIOR "T7-SLOTTED SETTING PLUGS" ALSO TO BE COATED WITH DURA-LITH GREASE. PLUG TO BE SET FLUSH WITH COIL INSERT APPROXIMATELY ½" BELOW CONCRETE SURFACE. FILL REMAINING VOID WITH SIKAFLEX-2C NS/SL SEALANT.

REFERENCE DRAWINGS:

SMS KEY PLAN — — — — 904D-140
SMS TRENCH PLAN & DETS. M&R — 904D-141 SH 1
VIT. FAC. GENERAL NOTES & REF DWG — 905D-710
8Q-4 & 8Q-5 PIT COVER VALVE — — 900D-2810
ACCESS PENETRATIONS

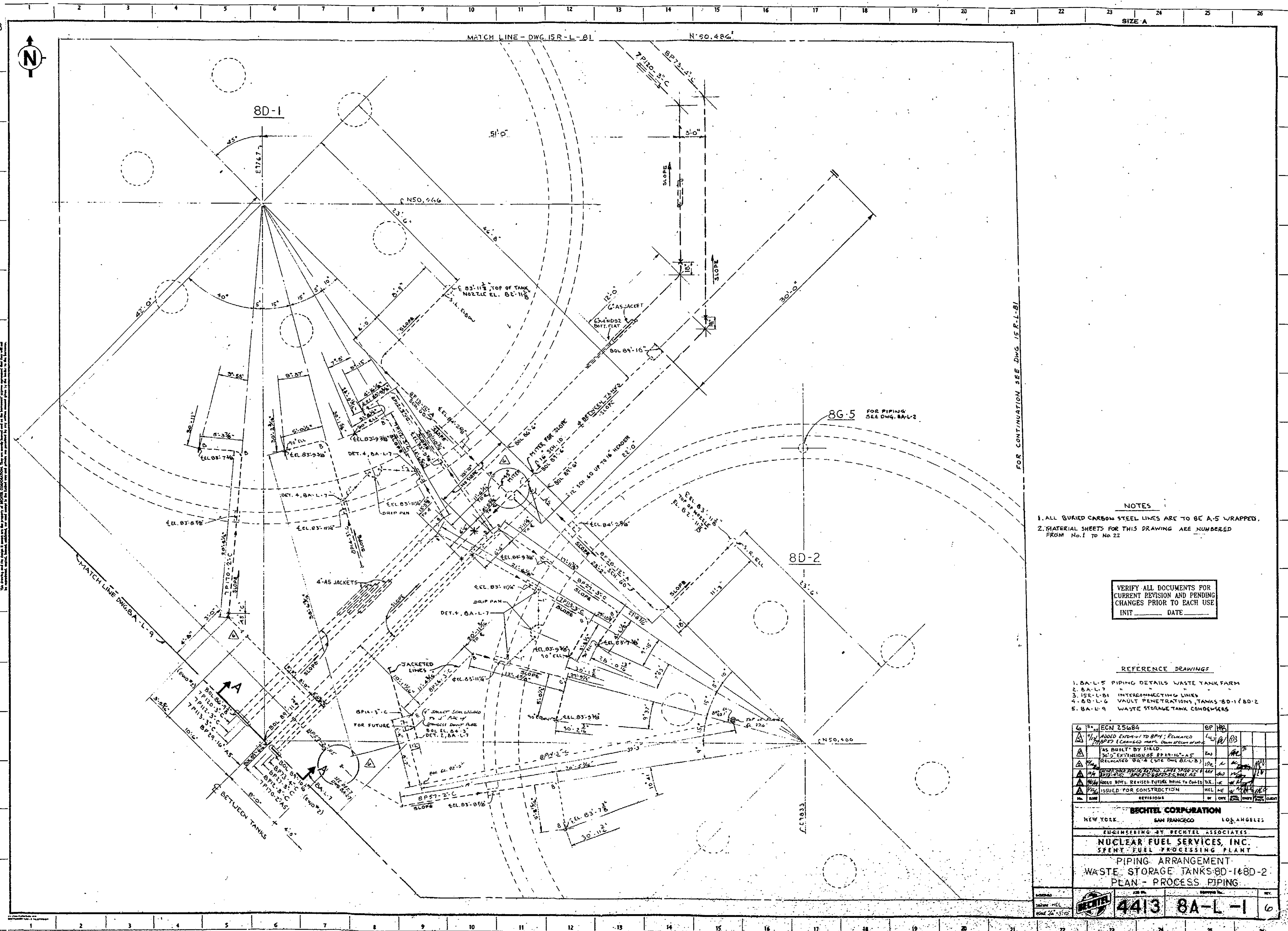
WVNS APPROVAL
COG. MGR.
COG. ENGR
DRFT. SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

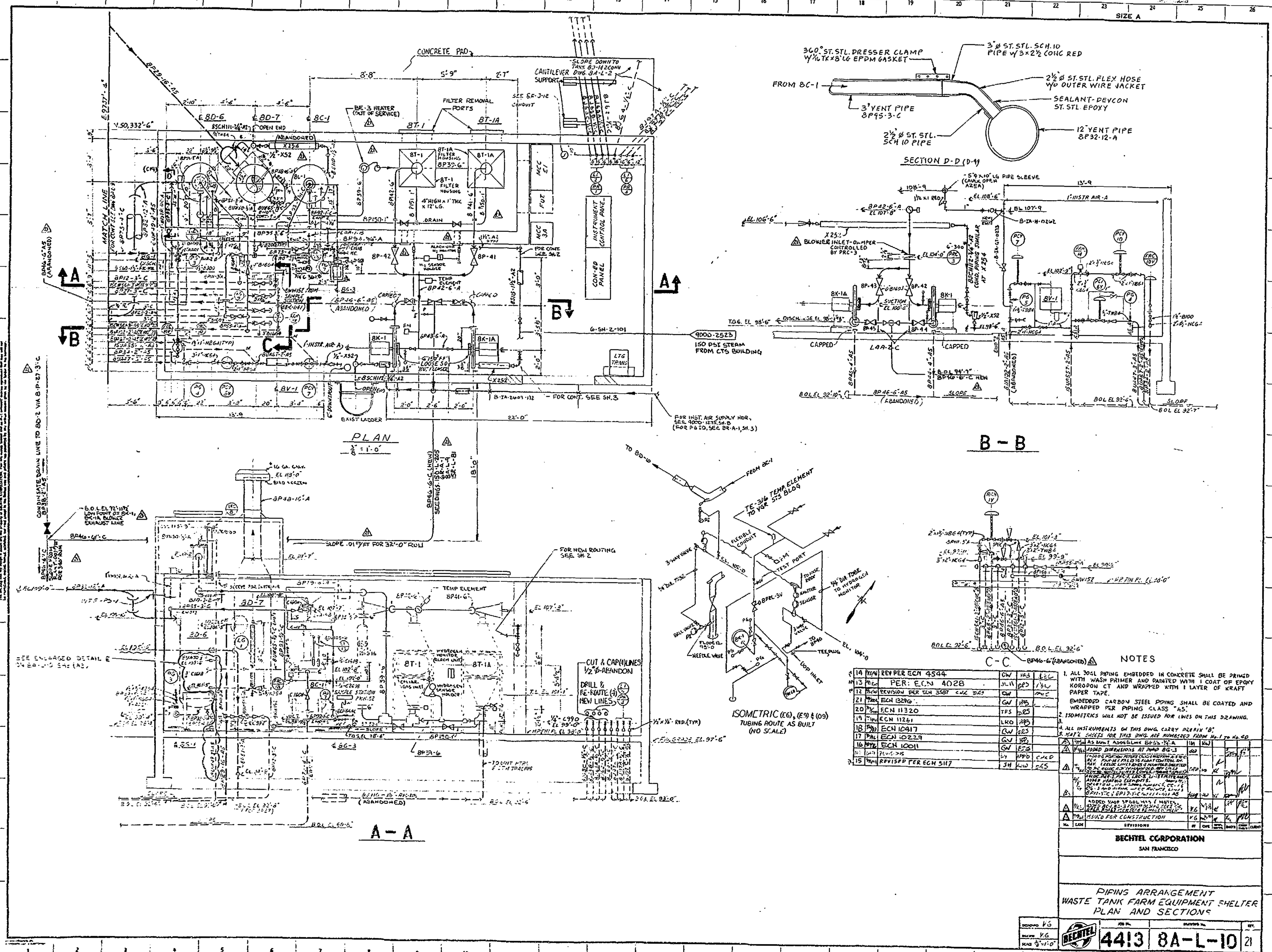
WORK THIS DWG WITH DWG'S 905-D-140 THRU 144
FOR DRAWING INDEX SEE DRAWING NO. ________

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 15
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
SLUDGE MOBILIZATION SYSTEM
TRENCH COVER SCHEDULE
SH 2.

APPRVD WVNS CO.	
PROJECT MGR	1/11/90
ENGINEER/SUPV	1/10/90
LEAD DISC ENGR	1/10/90
DESIGN	1-9-90
CHECKED	1-9-90
DRAWN	DATE 1/8/90

DE-AC07-81NE44139 PROJECT NO.
19-CWV-02275 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION
SIZE D
INDEX CODE NUMBER: AREA, DR. TYP, CL, ORIG
DRAWING NO. 904D-146
REV. 5
SCALE NONE
SPEC. CODES
A/E SHEET NO. 904-D-146 B


MATCH LINE - DWG. 15R-L-81
N 50,486'
8D-1
8D-2
8G-5
FOR PIPING SEE DWG. 8A-L-2
FOR CONTINUATION SEE DWG 15R-L-81
MATCH LINE DWG. 8A-L-9
℄ BETWEEN TANKS
N 50,466
N 50,400
E 7767
E 7833
SIZE A
NOTES
1. ALL BURIED CARBON STEEL LINES ARE TO BE A-5 WRAPPED.
2. MATERIAL SHEETS FOR THIS DRAWING ARE NUMBERED FROM No. 1 TO No. 22
VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE
INIT _______ DATE _______
REFERENCE DRAWINGS
1. 8A-L-5 PIPING DETAILS WASTE TANK FARM
2. 8A-L-7 " " " " "
3. 15R-L-81 INTERCONNECTING LINES
4. 8D-L-6 VAULT PENETRATIONS, TANKS 8D-1 & 8D-2
5. 8A-L-9 WASTE STORAGE TANK CONDENSERS
6 ECN 25684
5 ADDED EXTENSION TO BP14; RELOCATED BP57 & CHANGED MAT'L DOWNSTREAM OF VALVE
4 "AS BUILT" BY FIELD. 30'-5" EXTENSION OF 8P29-16"-A5
3 RELOCATED 8G-4 (SEE DWG 8A-L-3)
1 ADDED BPTS. REVISED FUTURE PIPING TO CONFORM
0 ISSUED FOR CONSTRUCTION
REVISIONS
BECHTEL CORPORATION
NEW YORK SAN FRANCISCO LOS ANGELES
ENGINEERING BY BECHTEL ASSOCIATES
NUCLEAR FUEL SERVICES, INC.
SPENT FUEL PROCESSING PLANT
PIPING ARRANGEMENT
WASTE STORAGE TANKS 8D-1 & 8D-2
PLAN - PROCESS PIPING
DRAWN HEL
4413 8A-L-1 6



NOTES

1. ALL 304L PIPING EMBEDDED IN CONCRETE SHALL BE PRIMED WITH WASH PRIMER AND PAINTED WITH 1 COAT OF EPOXY KOROPON CT AND WRAPPED WITH 1 LAYER OF KRAFT PAPER TAPE.
   EMBEDDED CARBON STEEL PIPING SHALL BE COATED AND WRAPPED PER PIPING CLASS "A5".
2. ISOMETRICS WILL NOT BE ISSUED FOR LINES ON THIS DRAWING.
3.
4. ALL INSTRUMENTS ON THIS DWG. CARRY PREFIX "B".
5. MAT'L SHEETS FOR THIS DWG. ARE NUMBERED FROM No. 1 TO No. 40

NO.	DATE	REVISIONS	BY	APPD	CHKD
14		REV PER ECN 4544	CW		
13		PER: ECN 4028	JLH	DRS	
12		REVISION PER ECN 3587	DW		
21		ECN 13296	GV		
20		ECN 11320	TFS	DRS	
19		ECN 11261	LRO		
18		ECN 10417	CW	DRS	
17		ECN 10229	GV		
16		ECN 10011	GV		
15		REVISED PER ECN 5117	JH		

NO.	DATE	REVISIONS	BY
		AS BUILT ADDED LINE 8P55-3/4"-A	
		ADDED DIMENSIONS AT PUMP 8G-3	
		[illegible]	
		ADDED HEATING ELEMENTS. [illegible]	
		ADDED VAOP SPOOL NOS. & NOTES. [illegible]	V.G.
		ISSUED FOR CONSTRUCTION	V.G.

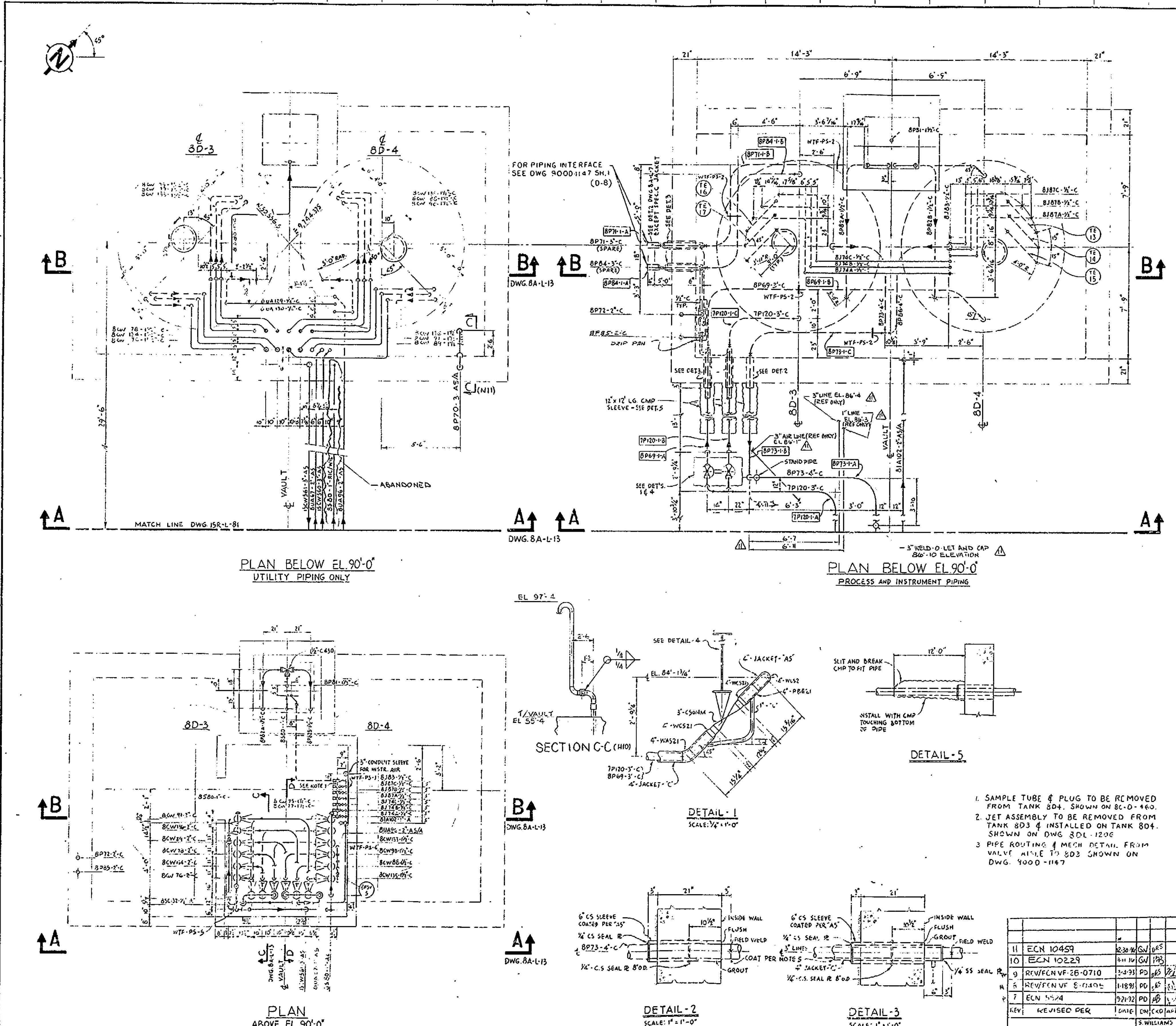
BECHTEL CORPORATION
SAN FRANCISCO

PIPING ARRANGEMENT
WASTE TANK FARM EQUIPMENT SHELTER
PLAN AND SECTIONS

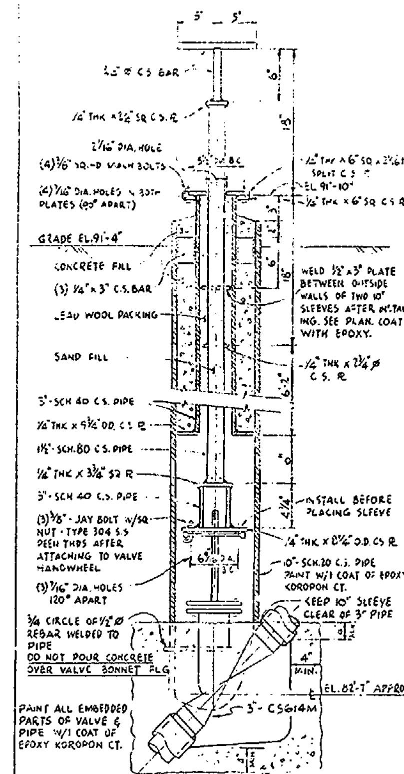
SCALE 3/8" = 1'-0"

4413 | 8A-L-10 | 21

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT______ DATE______



1. SAMPLE TUBE & PLUG TO BE REMOVED FROM TANK 8D4. SHOWN ON 8C-D-460.
2. JET ASSEMBLY TO BE REMOVED FROM TANK 8D3 & INSTALLED ON TANK 8D4. SHOWN ON DWG 8DL-1206
3. PIPE ROUTING & MECH DETAIL FROM VALVE AISLE TO 8D3 SHOWN ON DWG. 9000-1147



DETAIL - 4
VALVE EXTENSION STEM DETAIL

REFERENCE DRAWINGS

P. & I.D. - CON-ED WASTE STORAGE	8R-A-4
PIPING ARRG'T - W.T.F. - DETAILS	8A-L-5
PIPING SECTIONS - WASTE STORAGE TANKS 8D-3 & 8D-4	8A-L-13
PIPING ARRG'T - INTERCONNECTING LINES	15R-L-81
CON-ED WASTE STORAGE TANKS 8D-3 & 8D-4	8B-D-4
INSTRUMENT LOCATION PLAN - W.T.F.	8A-J-2
ELECTRICAL PLAN - W.T.F.	30A-P-32
PLAN, SECTIONS & DETAILS - VAULT FOR 8D-3 & 8D-4	8A-Q-9
PAVING AND GRADING PLAN	40A-S-27

NOTES:

1. FOR CONTINUATION OF INSTRUMENT PIPING SEE DWG 8A-J-2
2. FOR CONTINUATION OF THERMOCOUPLE WIRES SEE ELECTRICAL DWG 30A-P-32
3. DIMENSIONS AT TANKS 8D-3 & 8D-4 ARE TYPICAL, EXCEPT TO OPPOSITE HAND, UNLESS OTHERWISE NOTED.
4. MATERIAL SHEETS FOR THIS DRAWING ARE NUMBERED FROM No. 1 TO No. 38
5. ALL 304L PIPING EMBEDDED IN CONCRETE SHALL BE PRIMED WITH WASH PRIMER AND PAINTED WITH 1 COAT OF EPOXY KOROPON CT AND WRAPPED WITH 1 LAYER OF KRAFT PAPER TAPE.
6. EMBEDDED CARBON STEEL PIPING SHALL BE COATED AND WRAPPED PER PIPING CLASS "A5".
7. ALL WELDED JOINTS IN S.S PIPING SHALL BE 100% RADIOGRAPHED.

No.	DATE	REVISIONS	BY	CHK				
6	[illegible]	REV/ECN 3131	[illegible]			J.M.		
5	5/4/57	REVISED PER ECN 1543	WZ					
4	[illegible]	AS BUILT [illegible]	[illegible]					
3	4-21-66	REVISED UTILITY PIPING ADDED LINES 6CW 133, 134, 135 / 136 RELOCATED PIPING IN SHELTER	KKV					
2	[illegible]	ADD. SHOP SPOOL NO'S DELETED REFERENCE NOTE 8 AT LEAD WOOL PACKING - DET. 4	[illegible]					
1	[illegible]	ADDED DETAILS 4 & 5	[illegible]					
0	[illegible]	ISSUED FOR CONSTRUCTION	[illegible]					

REV	REVISED PER	DATE	DN	CKD	APD
11	ECN 10459	12-30-16	GV	DRS	
10	ECN 10229	4-11-16	GV	[illegible]	
9	REV/FCN VF-26-0710	2-4-93	PD	[illegible]	[illegible]
8	REV/FCN VF 8-0495	1-18-93	PD	[illegible]	[illegible]
7	ECN 5524	9-21-92	PD	[illegible]	[illegible]

S. WILLIAMS DESIGNED
S. WILLIAMS DRAWN
SCALE 1/8" = 1'-0"

BECHTEL CORPORATION
NEW YORK SAN FRANCISCO LOS ANGELES
ENGINEERING BY BECHTEL ASSOCIATES

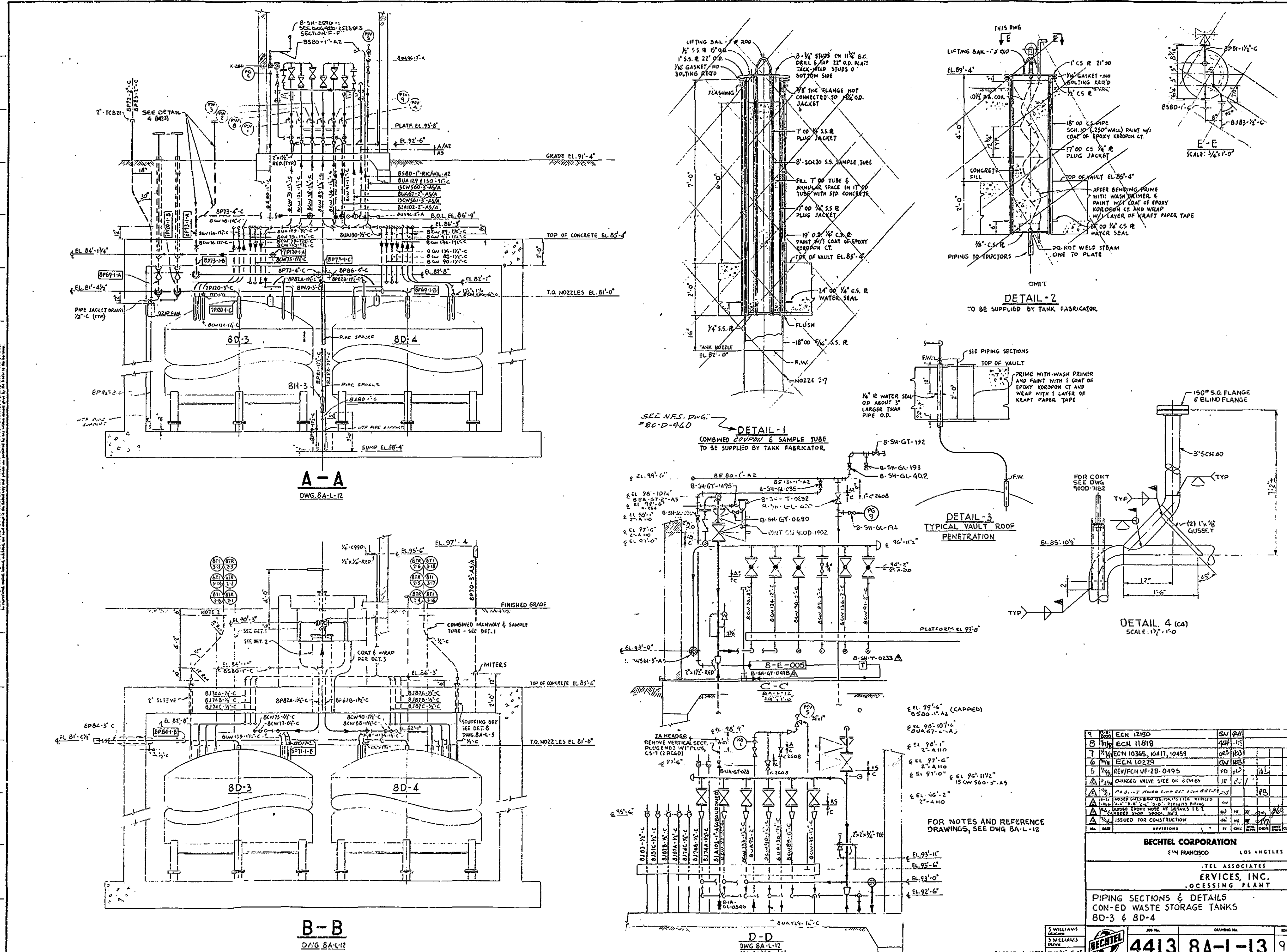
NUCLEAR FUEL SERVICES, INC.
SPENT FUEL PROCESSING PLANT

PIPING PLAN AND DETAILS
CON-ED WASTE STORAGE TANKS
8D-3 & 8D-4

JOB No.	DRAWING No.	REV.
4413	8A-L-12	11

VERIFY ALL DOCUMENTS FOR CURRENT REVISION AND PENDING CHANGES PRIOR TO EACH USE.
INIT________ DATE________

8A-L-13



No.	Date	Revisions	By	Chk				
9	12-8-2000	ECN 12150	GW	[illegible]				
8	[illegible]	ECN 11818	[illegible]	[illegible]				
7	[illegible]	ECN 10365, 10417, 10459	DRS	[illegible]				
6	[illegible]	ECN 10229	GW	[illegible]				
5	[illegible]	REV/FCN VF-2B-0495	PD	[illegible]		[illegible]		
4	[illegible]	CHANGED VALVE SIZE ON 8CW65	JR	[illegible]				
3	[illegible]	[illegible]	[illegible]			PB		
2	6-21-1966	ADDED LINES 8CW 135, 136, 137, 138. REVISED "A-A" "B-B" "C-C" "D-D". RELOCATED PIPING	[illegible]					
1	[illegible]	ADDED EPOXY NOTE AT DETAILS 1 & 2 ADDED SHOP SPOOL NO'S	[illegible]	[illegible]				
0	[illegible]	ISSUED FOR CONSTRUCTION	[illegible]	[illegible]				

BECHTEL CORPORATION
SAN FRANCISCO LOS ANGELES

.TEL ASSOCIATES
ERVICES, INC.
.OCESSING PLANT

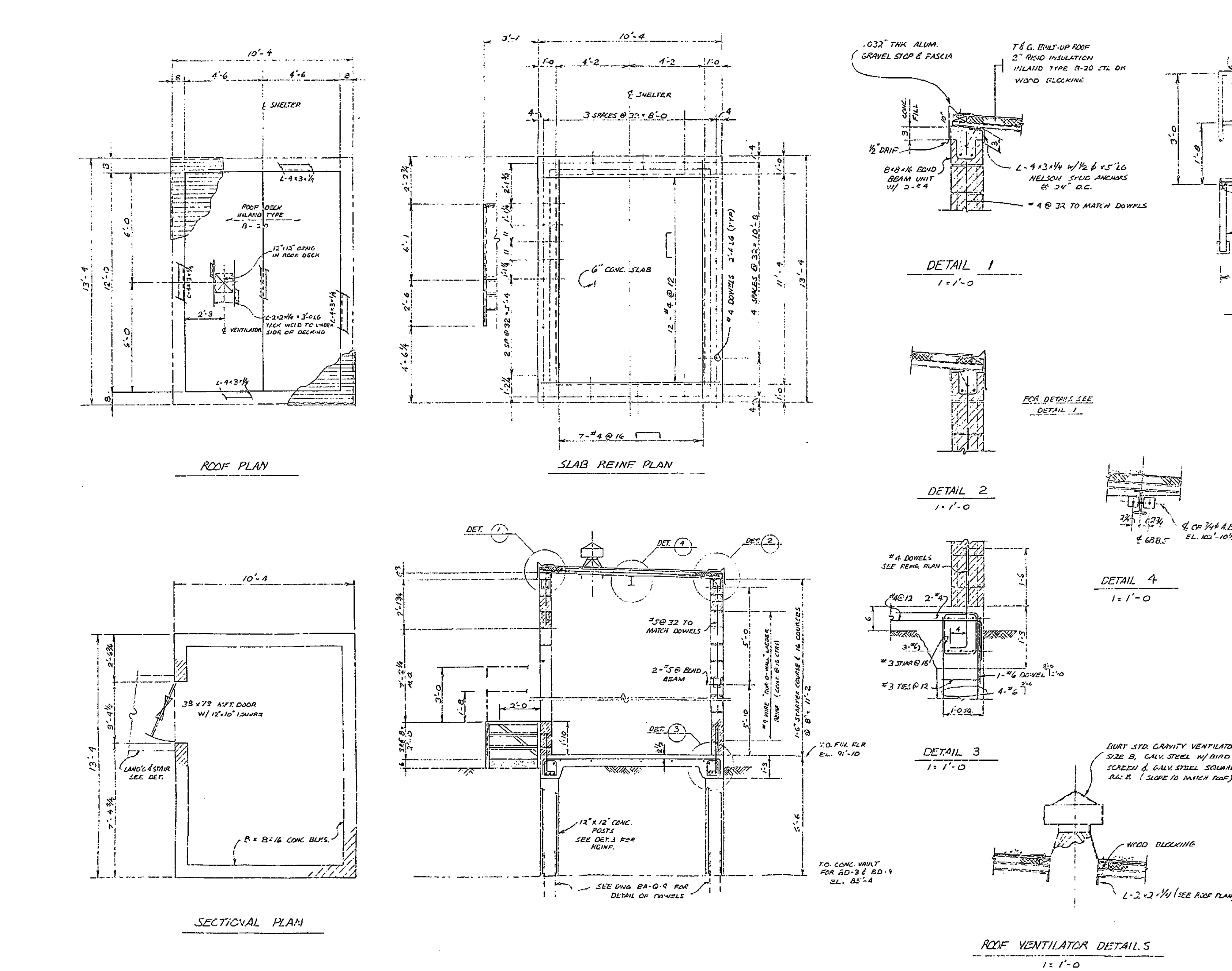
PIPING SECTIONS & DETAILS
CON-ED WASTE STORAGE TANKS
8D-3 & 8D-4

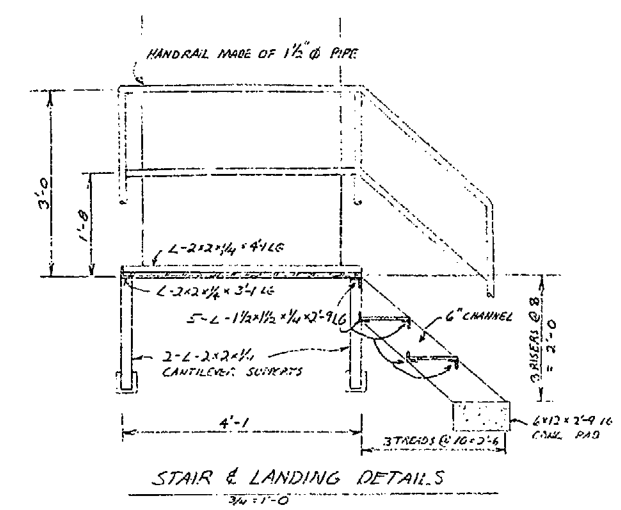
DESIGNED: S WILLIAMS
DRAWN: S WILLIAMS
SCALE 3/8" = 1'-0"

JOB No.	DRAWING No.	REV.
4413	8A-L-13	9

DRAWING NUMBER

8B-M-591





LIST OF MATERIAL

ITEM	QUAN	DESCRIPTION	ORDER NO
1	1	CONC. BLOCK SHELTER COMPLETE AS DETAILED INCLUDING FOUNDATION, ETC.	

NOTES:

1. FOR CONSTRUCTION & WORKMANSHIP OF THE CONC. BLOCK WALLS SEE SPECIFICATION Nº R-14. ALL BLOCKS SHALL BE LAID UP IN STACK BOND UNLESS NOTED OTHERWISE.
2. FOR WELDING ROOF DECK TO SUPPORTING MEMBERS FOLLOW MANUFACTURER'S SPECIFICATION & RECOMMENDATION.
3. FOR LOCATION OF SHELTER SEE DWG. 8A-Q-9
4. FOR PENETRATIONS IN FLOOR SLAB SEE DWG. 8A-L-12

REFERENCE DRAWINGS

PLAN, SECTION & DETAILS - VAULT FOR 8D-3 & 8D-4		8A-Q-9
HANDRAIL DETAILS		15B-M-101
STEEL ROOF DECK	SPEC.	4413-R-12
MASONRY	SPEC.	4413-R-14
PIPING PLAN AT CON-ED VAULT		8A-L-12
PLATFORM AT CON-ED SHELTER		8C-M-5

NO.	DATE	REVISIONS	BY	CH'K	APPR.	APPR.	APPR.
0	7/14/83	AS BUILT					

SCALE 1/8" = 1'-0 AND AS NOTED | DESIGNED | DRAWN R.K.H.

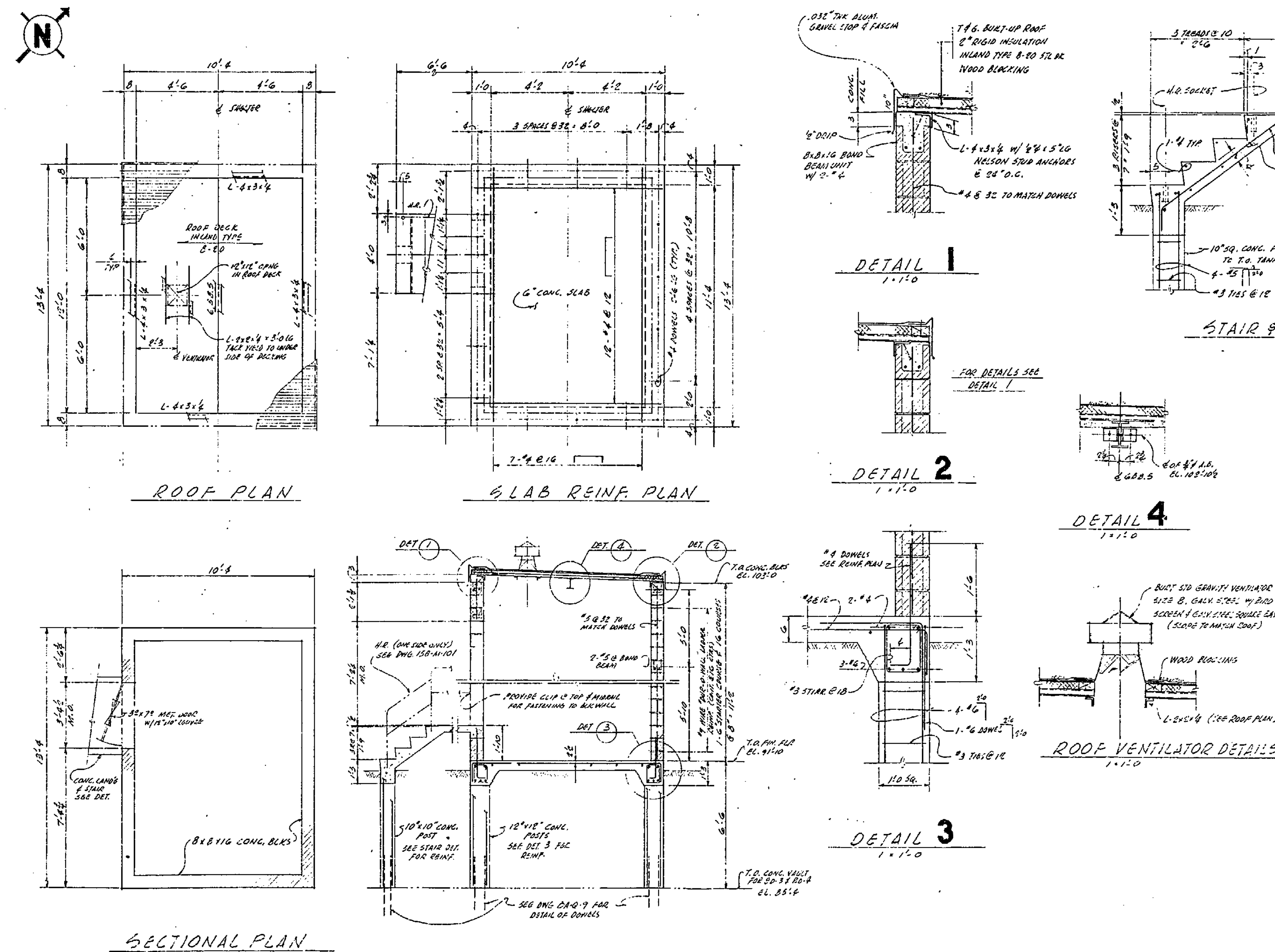
NUCLEAR FUEL SERVICES, INC.
SUBSIDIARY OF W. R. GRACE & CO.
WEST VALLEY, NEW YORK

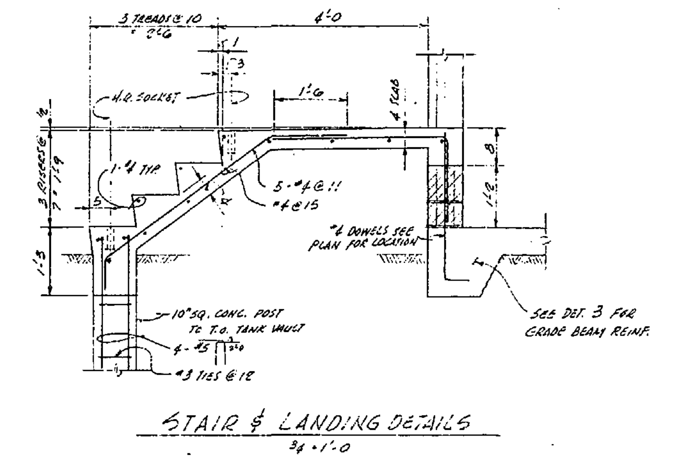
CONCRETE BLOCK SHELTER AT CON-ED VAULT
REDRAWN FROM BECHTEL DWG 8B-M-4

PROJECT NO.	DRAWING NO.	REV. NO.
	8B-M-591	0

8B-M-4

SIZE D (ASA)





LIST OF MATERIAL

ITEM	QUAN	DESCRIPTION	ORDER Nº
1	1	CONC. BLOCK SHELTER COMPLETE AS DETAILED INCLUDING FOUNDATION, ETC.	

NOTES:

1. FOR CONSTRUCTION & WORKMANSHIP OF THE CONC. BLOCK WALLS SEE SPECIFICATION Nº R-14. ALL BLOCKS SHALL BE LAID UP IN STACK BOND UNLESS NOTED OTHERWISE.
2. FOR WELDING ROOF DECK TO SUPPORTING MEMBERS FOLLOW MANUFACTURER'S SPECIFICATION & RECOMMENDATION.
3. FOR LOCATION OF SHELTER SEE DWG. 8A-Q-9
4. FOR PENETRATIONS IN FLOOR SLAB SEE DWG. 8A-L-12

REFERENCE DRAWINGS

PLAN, SECTIONS & DETAILS - VAULT FOR 8D-3 & 8D-4	8A-Q-9
HANDRAIL DETAILS	158-M-161
STEEL ROOF DECK SPEC.	4413-R-12
MASONRY SPEC.	4413-R-14
PIPING PLAN AT CON-ED VAULT	8A-L-12
PLATFORM AT CON-ED SHELTER	8C-M-5

NO.	DATE	REVISIONS	BY	CH'K	DFTG. SUPVR.	ENG'G	CHIEF ENG'R	CLIENT
△								
△								
△	11/22/64	ISSUED FOR CONSTRUCTION						

SCALE 3/8"=1'-0" AND AS NOTED — DESIGNED HAL — DRAWN HAL

BECHTEL CORPORATION
NEW YORK — SAN FRANCISCO — LOS ANGELES

ENGINEERING BY BECHTEL ASSOCIATES

NUCLEAR FUEL SERVICES, INC.
SPENT FUEL PROCESSING PLANT

CONCRETE BLOCK SHELTER
AT CON-ED VAULT

JOB No.	DRAWING No.	REV.
4413	8B-M-4	

D C B A A B C D

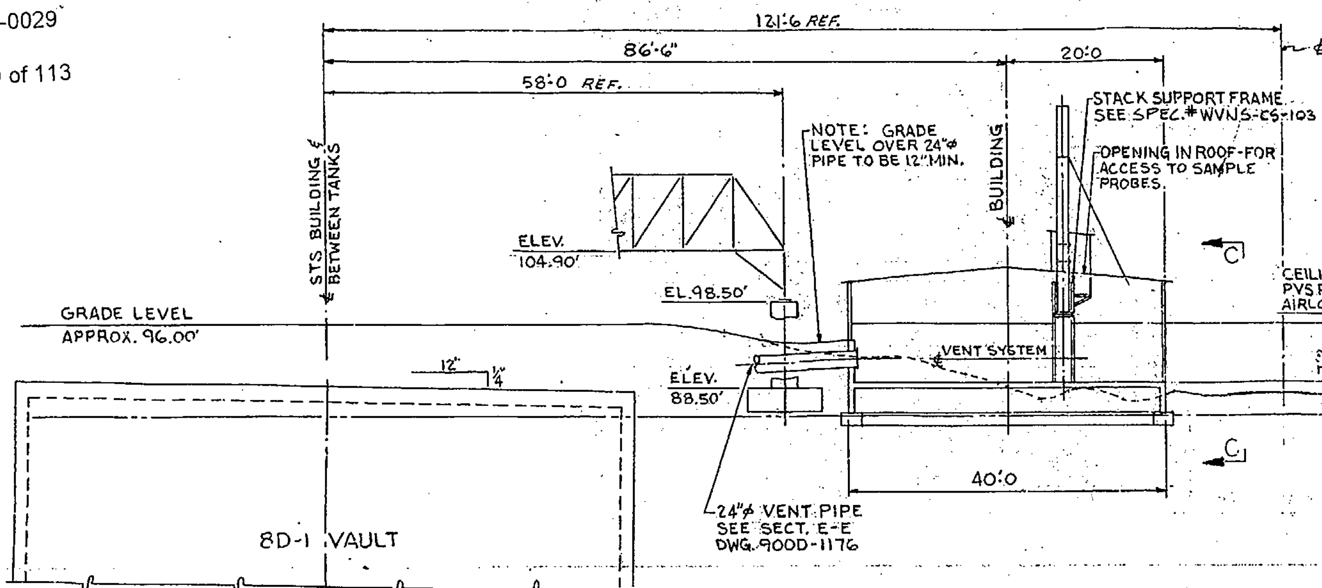
DWG NO. 900D-1175 SH 1

REVISIONS

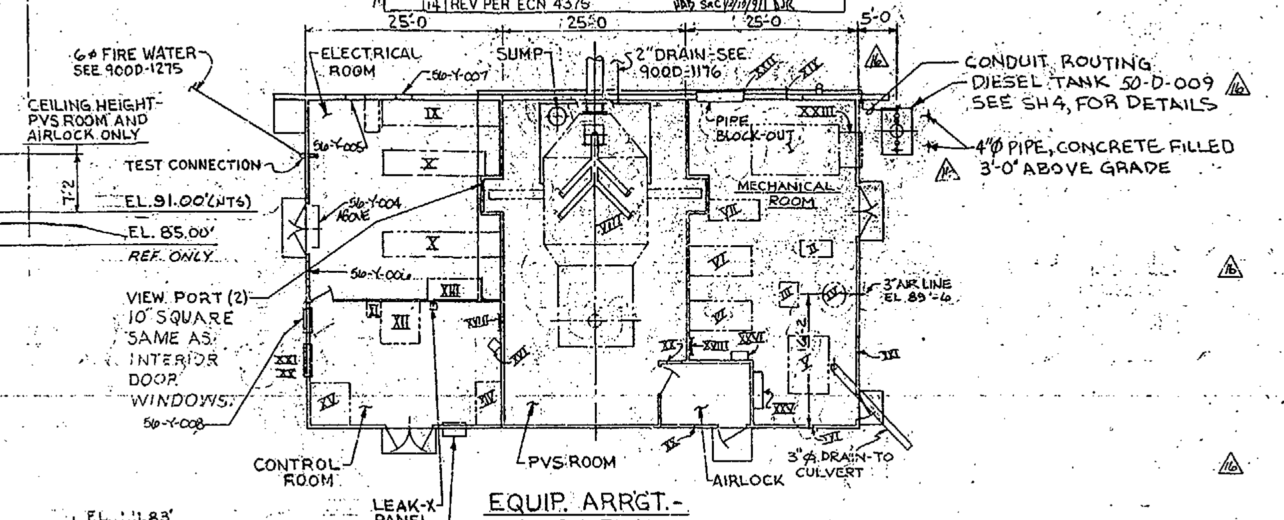
ZONE	REV	DESCRIPTION	DATE	APPROVED
	7	REVISED PER ECN 1353 SJS	1-16-87	
	8	REVISION PER ECN 2032 GN	11-5-87	JWW
	9	REV'D. PER ECN# 2628&2628A DCS	11-15-88	
	10	REV. PER ECN 3762 GM	6/29/90	
	11	REV. PER ECN 3842 CHK DCS	8/3/90	MV 9/10/90
REV TABLE	12	REVISED PER ECN 4563 SB	9/23/91	WGS 9/25/91
REV TABLE	13	REV. PER ECN 4637 MJC	10/30/91	11/26/91
	14	REV PER ECN 4375 SAC	12/10/91	DJR

REVISIONS

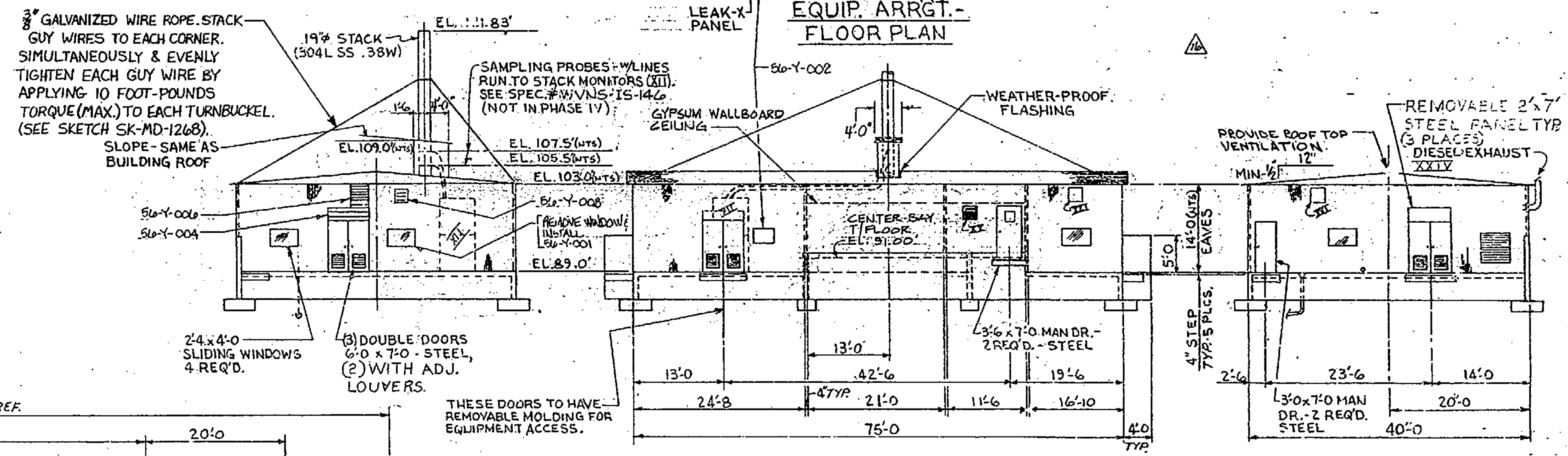
ZONE	REV	DESCRIPTION	BY	DATE	APPROVED
	15	REV/PER ECN 8719	MJL	4-5-96	
	16	ECN 10822		1/8/99	
	3	REV. PER ECN 1040	JEN	9/23/86	
	4	REV. PER ECN 1138	DDK	10-22-86	
	5	REV. PER ECN 1172	WAB	11-14-86	
	6	REV. PER ECN 1261	WAB	12-3-86	



SECTION A-A (FROM 900D-1176)
SCALE: 1" = 10'-0
(TAKEN ON ℄ & BETWEEN TANK 8D-1 & 8D-2)



EQUIP. ARRGT.-FLOOR PLAN

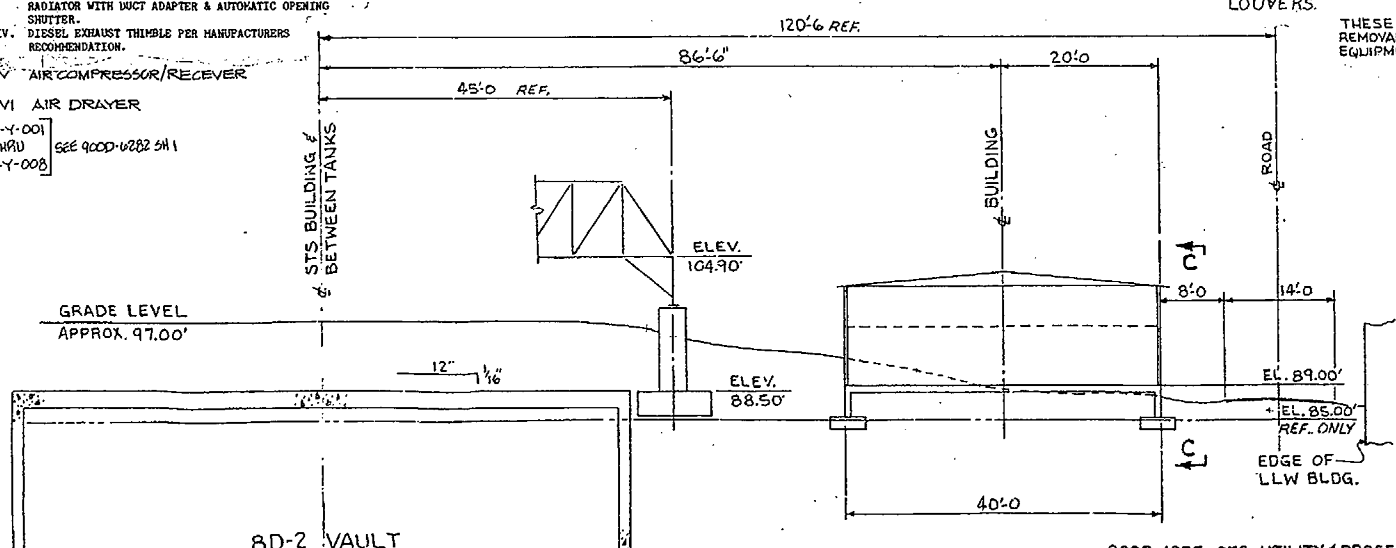


BUILDING & FOUNDATION ELEVATION C-C
SCALE: 1" = 10'-0

LEGEND DESCRIPTION

- I. AUXILIARY GENERATOR
- II. AUXILIARY AIR COMPRESSOR — FUTURE
- III. AIR DRYER
- IV. AIR RECEIVER
- V. AIR COMPRESSOR
- VI. PUMP - SMS — FUTURE
- VII. PUMP - SMS — FUTURE
- VIII. VENT DUCT CONSISTING OF FOUR (4) 8" DIA. X 10" LONG RUNS EACH WITH A BLAST GATE
- IX. MCCA RACK
- X. SLUDGE MOB. STARTERS
- XI. STRIP CHART RECORDER (ST. MON.)
- XII. STACK MONITOR (2 STACKED)
- XIII. VENT SYSTEM CONTROL PANEL
- XIV. STACK MONITOR CONTROL PANEL
- XV. SLUDGE MOB. — FUTURE
- XVI. 5KW HEATER PER SECTION 15500 PARA 5.5, SPEC. WVNS-CS-103
- XVII. A/C, WALL MOUNTED, 1 TON, 15 AMP, 125V HIGH EFFICIENCY, STANDARD MODEL 2-WAY AIR DIRECTION WITH FILTERS.
- XIX. LOUVER - AIR INTAKE 2' X 2' AUXILIARY-GENERATOR - ELECTRIC ROOM - 2 EACH - 2' SQUARE PER INDUSTRIAL ACOUSTICS CO. NOISE SHIELD LOUVERS OR EQUIVALENT.
- XX. FILTER MEDIUM EFFICIENCY BARKER - COLEMAN MODEL G11 WITH HINGED CORE, INSIDE GRILL (BUL. F 16707-2) OR EQUAL (WITH FAN OR FIXED LOUVER).
- XXI. EXHAUST FAN PER PG. 2 EXHIBIT 1, SECTION 13100, SPEC. WVNS-CS-103 OR EQUAL, AIR COMPRESSOR COOLING (2) & CONTROL ROOM WITH XX.
- XXII. LOUVER AIR INTAKE 6' X 6' AUX. GENERATOR
- XXIII. EXHAUST VENT 5' 7" X 5' 2" FOR AUXILIARY GENERATOR RADIATOR WITH DUCT ADAPTER & AUTOMATIC OPENING SHUTTER.
- XXIV. DIESEL EXHAUST THIMBLE PER MANUFACTURERS RECOMMENDATION.
- XXV AIR COMPRESSOR/RECEVER
- XXVI AIR DRAYER

56-Y-001 THRU 56-Y-008 — SEE 900D-6282 SH 1



SECTION B-B (FROM 900D-1176)
SCALE: 1" = 10'-0
(TAKEN ON ℄ OF TANK 8D-2)

900D-1275 STS-UTILITY & PROCESS LINES-GENL. LAYOUT
900E-1235 FINAL GRADE NORTH OF PROCESS BLDG.
900D-1176 TANK FARM VENT. PIPING & SVC. BLDG.
REF. DWGS.

1. INFORMATION TO BE SUPPLIED BY VENDOR ON SIZE & LOCATION OF FIRE WATER TEST CONNECTIONS.

NOTES:

0	9	6	16	REV	REV STATUS
4	3	2	1	SHEET	OF SHEETS

QTY. REQD.	SYM	ITEM NO.	NOMENCLATURE OR DESCRIPTION	CODE IDENT. NO.	PART OR IDENTIFYING NO.	MATERIAL	SPECIFICATION	ZONE

PARTS LIST

INDEX CODE NUMBER				UNLESS OTHERWISE SPECIFIED	CONTRACT NO.	
AREA	DWG. TYPE	SYS.	ORIG.		DFTSMN. D. SHAFFER	DATE OF DWG. 2-28-86
800	08	50	01	TOLERANCES - DO NOT SCALE	CHECKER 3/12/86 R. SCHIFF	DFTG. SUPVR. JOHN HORTON 3/10/86
SPEC CODE				2PL DEC ±.05' / 3PL DEC ± N/A / ANGLES ± N/A / AA	DESIGN 3/12/86 R. SCHIFF	ENGR. 3/12/86 E.W. SHERMAN
				FRACTIONS ± 1/16		
					FACILITIES 3/13/86 LARRY WIEDEMANN	Q.A. 3/13/86 S.R. HASLAR
					ENGR. 3/13/86 R.R. SOFUSCH	E & OS 3/10/86 K.J. SIMON

A/E CONTRACT NO. — CODE IDENT. NO.

FOR West Valley Nuclear Services Co., Inc.
West Valley, New York

TANK FARM VENTILATION & SERVICE BUILDING GRADE CROSS SECT. & BLDG. ELEV.

DWG. SIZE D — SCALE NOTED — WEIGHT — A/E DWG NO. — DWG NO. 900D-1175 — REV 16 — SHEET 1 OF 4

Appendix B

MicroShield™ Modeling Results for HLW Transfer Trench Piping

Component or area: Lines 55-PH-2-034, 55-PH-2-038, 55-PH-3-003 and 55-PH-3-021

Model geometry used: Cylinder Surface - External Dose Point

Given/Facts:

1. Unshielded radiation probe readings were taken inside the transfer trench at CS-271. The highest reading measured was 9.8 mR/hr.

2. Lines 55-PH-2-034 and 55-PH-2-038, are 2" diameter lines and are enclosed in 4" lines for double containment. These lines are constructed of Schedule 40 stainless steel.

3. Lines 55-PH-3-021 and 55-PH-3-003, are 3" diameter lines and are enclosed in 6" lines for double containment. These lines are constructed of Schedule 40 stainless steel.

Assumptions:

1. The transfer trench was modeled conservatively by using the highest dose reading measured in the trench. The dose point used was at a distance of the longest distance in the trench, or a cross sectional diagonal of the trench. (In other words, it is assumed that the dose point was taken at one corner of the trench, with the source as each individual pipe running through the other corner of the trench.)

2. All radiation is assumed to be coming from each individual line.

3. The internal surfaces of the lines are assumed to be uniformly contaminated with Cs-137.

4. Each line is assumed to be 5' long. In order to get the total curie content of each line, the results will have to be scaled to the entire length of piping.

<u>Input into the model</u>

Distance of the detector to the source: Trench depth = 6' 0.5" (from Drawing 904D-0142)
Trench width = 6' (from Drawing 904D-060)

$$\text{Detector distance} = \sqrt{(72")^2 + (72.5")^2} = 102.2"$$

Dimensions of the lines: 2.375" O.D., 0.154" wall thickness* x 5' length
3.5" O.D., 0.216" wall thickness* x 5' length
4.5" O.D., 0.237" wall thickness* x 5' length
6.625" O.D., 0.280" wall thickness* x 5' length

Reading modeled: 9.8 mR/hr
Drawings/References: Drawing 904D-0142, Drawing 904D-060, "Sludge Mobilization System Piping Line List," WVNS-UPLL-010, Revision 10
Work Documents/Surveys: Radiation and Contamination Survey Report 123224, Work Instruction SMTS-994356

*Wall thicknesses and radii of the lines are based on information from "Pocket Ref," Thomas J. Glover, Sequoia Publishing, Inc.

Model prepared by: E. Lachapelle 2/3/04
Signature/Print name/Date

Model peer reviewed by: E. Y. LAUBER 3 Feb 04
Signature/Print name/Date

MicroShield v6.02 (6.02-0000)
Grove Engineering

Page : 1
DOS File : Lines 55-PH-2-034 and 038.ms6
Run Date: February 3, 2004
Run Time: 10:01:05 AM
Duration : 00:00:00

File Ref: N/A
Date: 2/3/04
By: EL
Checked: EZ

Case Title: Lines at CS-271
Description: Lines 55-PH-2-034 and 038, based on 9.8 mR/hr
Geometry: 10 - Cylinder Surface - External Dose Point

Source Dimensions

Height	152.4 cm	5 ft 0.0 in
Radius	2.625 cm	1.0 in

Dose Points

	X	Y	Z
# 1	265.303 cm	76.2 cm	0 cm
	8 ft 8.5 in	2 ft 6.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Cyl. Radius	2.625 in	Air	0.00122
Transition	.826 in	Air	0.00122
Shield 2	.237 in	Iron	7.86
Air Gap		Air	0.00122
Wall Clad	.154 in	Iron	7.86

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm²	Bq/cm²
Ba-137m	2.6296e-001	9.7296e+009	1.0461e+002	3.8707e+006
Cs-137	2.7797e-001	1.0285e+010	1.1058e+002	4.0916e+006

Buildup
The material reference is : Shield 2

Integration Parameters

Y Direction (axial)	20
Circumferential	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0045	1.010e+08	1.337e-194	4.396e-27	9.161e-195	3.014e-27
0.0318	2.014e+08	1.343e-23	1.489e-23	1.119e-25	1.240e-25
0.0322	3.716e+08	1.473e-22	1.637e-22	1.185e-24	1.317e-24
0.0364	1.352e+08	2.697e-16	3.115e-16	1.533e-18	1.770e-18
0.6616	8.755e+09	3.038e+03	5.055e+03	5.889e+00	9.800e+00
TOTALS:	9.564e+09	3.038e+03	5.055e+03	5.889e+00	9.800e+00

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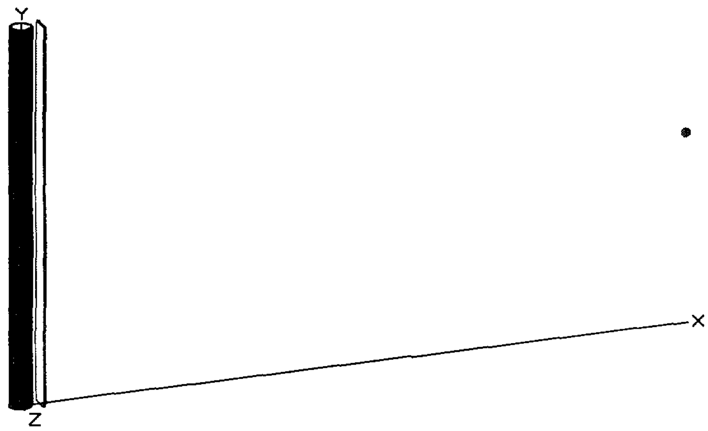
Grove Engineering

Page : 1
DOS File : Lines 55-PH-3-003 and 021.ms6
Run Date: February 3, 2004
Run Time: 10:08:02 AM
Duration : 00:00:00

File Ref: N/A
Date: 2/3/04
By: EL
Checked: EL

Case Title: Lines at CS-271
Description: Lines 55-PH-3-003 and 021, based on 9.8 mR/hr
Geometry: 10 - Cylinder Surface - External Dose Point



Source Dimensions

Height	152.4 cm	5 ft 0.0 in
Radius	3.896 cm	1.5 in

Dose Points

	X	Y	Z
# 1	2.68e+02 cm	76.2 cm	0 cm
	8 ft 9.5 in	2 ft 6.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Cyl. Radius	3.896 in	Air	0.00122
Transition	1.283 in	Air	0.00122
Shield 2	.28 in	Iron	7.86
Air Gap		Air	0.00122
Wall Clad	.216 in	Iron	7.86

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm²	Bq/cm²
Ba-137m	2.9513e-001	1.0920e+010	7.9102e+001	2.9268e+006
Cs-137	3.1198e-001	1.1543e+010	8.3618e+001	3.0939e+006

Buildup
The material reference is : Shield 2

Integration Parameters

Y Direction (axial)	20
Circumferential	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0045	1.134e+08	4.544e-246	4.838e-27	3.114e-246	3.316e-27
0.0318	2.261e+08	8.903e-30	7.509e-26	7.416e-32	6.254e-28
0.0322	4.171e+08	1.563e-28	1.408e-25	1.258e-30	1.133e-27
0.0364	1.518e+08	1.666e-20	1.945e-20	9.468e-23	1.105e-22
0.6616	9.826e+09	2.720e+03	5.053e+03	5.273e+00	9.797e+00
TOTALS:	1.073e+10	2.720e+03	5.053e+03	5.273e+00	9.797e+00

Component or area: Lines 55-PH-2-004, 55-PH-2-005 and 55-PH-2-008

Model geometry used: Cylinder Surface - External Dose Point

Given/Facts:

1. Unshielded radiation probe readings were taken inside the transfer trench at CS-138. The highest reading measured was 2.9 mR/hr.

2. These lines are 2" diameter lines and are enclosed in 4" lines for double containment. These lines are constructed of Schedule 40 stainless steel.

Assumptions:

1. The transfer trench was modeled conservatively by using the highest dose reading measured in the trench. The dose point chosen was set at the longest possible distance of any line from the dose point. This was determined from Drawing 900D-2826, Sheet 1. The lines are contained to a cross sectional area of 22.5" x 118.5". The longest distance would be a diagonal line across this rectangular area.

2. All radiation is assumed to be coming from each individual line.

3. The internal surfaces of the lines are assumed to be uniformly contaminated with Cs-137.

4. Each line is assumed to be 5' long. In order to get the total curie content of each line, the results will have to be scaled to the entire length of piping.

<u>**Input into the model**</u>

Distance of the detector to the source:

$$\text{Detector distance} = \sqrt{(22.5")^2 + (118.5")^2} = 120.6"$$

Dimensions of the lines: 2.375" O.D., 0.154" wall thickness* x 5' length
4.5" O.D., 0.237" wall thickness* x 5' length

Reading modeled: 2.9 mR/hr
Drawings/References: Drawing 900D-2826, Sheet 1, Drawing 904D-060, "Sludge Mobilization System Piping Line List," WVNS-UPLL-010, Revision 10
Work Documents/Surveys: Radiation and Contamination Survey Report 123224, Work Instruction SMTS-994356

*Wall thicknesses and radii of the lines are based on information from "Pocket Ref," Thomas J. Glover, Sequoia Publishing, Inc.

Model prepared by: E. Lachapelle E. Lachapelle 2/3/04
Signature/Print name/Date

Model peer reviewed by: Eric J. Lauber E. J. LAUBER 3-Feb-04
Signature/Print name/Date

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Page : 1
DOS File : Lines 55-PH-2-034, 005 and 008.ms6
Run Date: February 3, 2004
Run Time: 9:58:27 AM
Duration : 00:00:00

File Ref: N/A
Date: 2/3/04
By: EL
Checked: [illegible]

Case Title: Lines at CS-271
Description: Lines 55-PH-2-004, 005 and 008, based on 2.9 mR/hr
Geometry: 10 - Cylinder Surface - External Dose Point

Source Dimensions

Height	152.4 cm	5 ft 0.0 in
Radius	2.625 cm	1.0 in

Dose Points

	X	Y	Z
# 1	312.039 cm	76.2 cm	0 cm
	10 ft 2.8 in	2 ft 6.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Cyl. Radius	2.625 in	Air	0.00122
Transition	.826 in	Air	0.00122
Shield 2	.237 in	Iron	7.86
Air Gap		Air	0.00122
Wall Clad	.154 in	Iron	7.86

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm²	Bq/cm²
Ba-137m	1.0670e-001	3.9479e+009	4.2448e+001	1.5706e+006
Cs-137	1.1279e-001	4.1733e+009	4.4871e+001	1.6602e+006

Buildup
The material reference is : Shield 2

Integration Parameters

Y Direction (axial)	20
Circumferential	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0045	4.098e+07	4.394e-195	1.299e-27	3.012e-195	8.903e-28
0.0318	8.173e+07	4.417e-24	4.895e-24	3.679e-26	4.078e-26
0.0322	1.508e+08	4.833e-23	5.371e-23	3.890e-25	4.323e-25
0.0364	5.488e+07	8.665e-17	1.001e-16	4.923e-19	5.685e-19
0.6616	3.552e+09	8.991e+02	1.496e+03	1.743e+00	2.900e+00
TOTALS:	3.881e+09	8.991e+02	1.496e+03	1.743e+00	2.900e+00

Appendix C

Peer Reviewed Batch 10 Vitrification Run Scaling Factors for
HLW Trench Piping and Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

Batch 10 Vitrification Run Scaling Factors for HLW Trench Piping and Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

Project Isotope	Batch 10 Radionuclide Distribution Analysis Date May 15,1997 (μCi/g)	Batch 10 Radionuclide Distribution Analysis Decayed/Ingrown to September 30, 2004 (μCi/g)	Batch 10 Scaling Factor Decayed/Ingrown to September 30, 2004
C-14	4.90e-04	4.90e-04	2.03e-07
Tc-99	8.45e-02	8.45e-02	3.51e-05
I-129	3.90e-07	3.90e-07	1.62e-10
U-232*	9.97e-03	9.29e-03	3.85e-06
U-233	3.60e-03	3.60e-03	1.49e-06
U-234	1.30e-03	1.38e-03	5.73e-07
U-235	3.80e-05	3.80e-05	1.58e-08
Np-237	2.00e-02	2.00e-02	8.30e-06
U-238	3.40e-04	3.40e-04	1.41e-07
Pu-238	3.96e+00	3.74e+00	1.55e-03
Pu-239	1.09e+00	1.09e+00	4.52e-04
Pu-240	7.70e-01	7.74e-01	3.21e-04
Pu-241	3.43e+01	2.40e+01	9.96e-03
Am-241	3.21e+01	3.21e+01	1.33e-02
Cm-243	2.58e-01	2.16e-01	8.96e-05
Cm-244	6.72e+00	5.07e+00	2.10e-03
Cs-137	2.85e+03	2.41e+03	1.00e+00
Sr-90	2.75e+03	2.30e+03	9.54e-01

* U-232 was not analyzed for in the Batch 10 sample. A conservative scaling factor was developed by taking the highest ratio for U-232:U-233, U-232:U-234, and U-232:U-238 using the isotopic distributions developed in the ORIGEN-based spent nuclear fuel distribution (Memorandum FI:2002:0003 (Reissue), J. L. Mahoney to Distribution, "Bounding Isotope Ratios for NFS Spent Fuels," dated February 19, 2002) and then using that ratio's value for U-232 above. The U-232:U-234 ratio resulted in a bounding value of 9.97e-03 which resulted in a corrected scaling factor of 3.69e-06 for U-232.

Prepared By: J. M. Fazio ~~2/18/04~~ 2/13/04 MG 2/16/04

Peer Reviewed By: L. M. Michalczak 2/13/04

Appendix D

MicroShield™ Modeling Results for Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

Component or area: 8Q-1 Pit

Model geometry used: Rectangular Volume

Given/Facts:

1. Unshielded probe readings were taken inside the 8Q-1 pit at 1 foot intervals. The highest reading measured was 53.4 mR/hr.

2. There is approximately 382 lbs of piping/equipment within the 8Q-1 pit. (WO 9400911)

Assumptions:

1. The pit was modeled using a conservative approach by obtaining the highest dose reading measured in the pit and moving the dose point to the outside of the volume and the density of the source was determined by using the weight of the equipment inside the pit.

2. All contamination was assumed to be exclusively Cs-137.

3. Material in the pit was assumed to be iron.

Calculation:
Input into the model

Detector position: Flush with top of pit area; centered geometrically over the pit at a distance of 2" from the surface of the volume.
Source dimensions: 5"10.75" by 11' by 13'
Reading modeled: 53.4 mR/hr
Source material: Combination of air, piping and components (382 lbs)
Drawings: 904D-125, Rev.6
Work Documents/Surveys: Radiation Protection Survey #122979, WO 9400911

Model prepared by: Eva Y Lauber E.Y. Lauber 13 Jan 04
Signature/Print name/Date

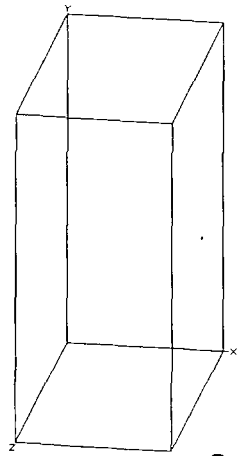
Model peer reviewed by: E. B. Lachapelle E.B. Lachapelle 1/13/04
Signature/Print name/Date

MicroShield v6.02 (6.02-0000)
Grove Engineering

Page : 1
DOS File : 8Q1PitCharacterization_03Dec30EYL.ms6
Run Date: January 12, 2004
Run Time: 7:53:07 AM
Duration : 00:00:01

File Ref: ________
Date: 13Jan04
By: Eric J Laulkr
Checked: EL

Case Title: 8Q-1 Pit
Description: WTF Characterization
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	179.705 cm	5 ft 10.8 in
Width	335.28 cm	11 ft
Height	396.24 cm	13 ft 0.0 in

Dose Points

	X	Y	Z
# 1	184.785 cm	198.12 cm	167.64 cm
	6 ft 0.7 in	6 ft 6.0 in	5 ft 6.0 in

Shields

Shield Name	Dimension	Material	Density
Source	2.39e+07 cm³	Carbon	0.00725
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm³	Bq/cm³
Ba-137m	2.9546e-001	1.0932e+010	1.2376e-002	4.5791e+002
Cs-137	3.1233e-001	1.1556e+010	1.3082e-002	4.8405e+002

Buildup
The material reference is : Source

Integration Parameters

X Direction	10
Y Direction	20
Z Direction	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	2.263e+08	2.523e+01	3.413e+01	2.102e-01	2.843e-01
0.0322	4.176e+08	4.718e+01	6.385e+01	3.797e-01	5.139e-01
0.0364	1.520e+08	1.967e+01	2.679e+01	1.118e-01	1.522e-01
0.6616	9.837e+09	2.557e+04	2.705e+04	4.956e+01	5.245e+01
TOTALS:	1.063e+10	2.566e+04	2.718e+04	5.027e+01	5.340e+01

Component or area: 8Q-2 Pit

Model geometry used: Rectangular Volume

Given/Facts:

1. Unshielded probe readings were taken inside the 8Q-2 pit at 1 foot intervals. The highest reading measured was 33.5 R/hr.

2. There is approximately 417 lbs of piping/equipment within the 8Q-2 pit. (WO 9400911)

Assumptions:

1. The pit was modeled using a conservative approach by obtaining the highest dose reading measured in the pit and moving the dose point to the outside of the volume. The density of the source was determined by using the weight of the equipment inside the pit.

2. All contamination was assumed to be exclusively Cs-137.

3. Material in the pit was assumed to be iron.

Calculation:
<u>Input into the model</u>

Detector position: Flush with top of pit area; centered geometrically over the pit at a distance of 2" from the surface of the volume.
Source dimensions: 6'.5" by 12' by 13' 6"
Reading modeled: 33.5 R/hr
Source material: Combination of air, piping and components (417 lbs. at a density of .00683 gm/cm3)
Drawings: 904D-125, Rev.6, 904D-126 Rev. 5
Work Documents/Surveys: Radiation Protection Survey #122979, WO 9400911

Model prepared by: E.Y. Lauber E.Y. Lauber 19 Jan 04
Signature/Print name/Date

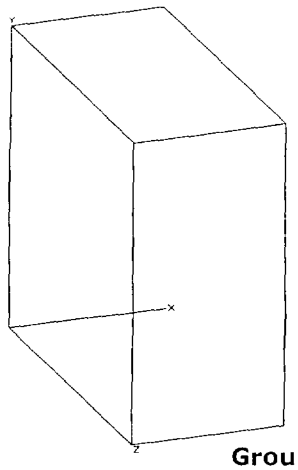
Model peer reviewed by: E.B. Lachapelle E.B. Lachapelle 1/9/04
Signature/Print name/Date

MicroShield v6.02 (6.02-0000)
Grove Engineering

Page : 1
DOS File : 8Q2PitCharacterization_04Jan11EYL.ms6
Run Date: January 12, 2004
Run Time: 8:15:12 AM
Duration : 00:00:01

File Ref:
Date: 19 Jan 04
By: [illegible]
Checked: [illegible]

Case Title: 8Q-2 Pump Pit
Description: WTF Characterization of 8Q-2 Pump Pit based on 33.5 R/hr
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	184.15 cm	6 ft 0.5 in
Width	411.48 cm	13 ft 6.0 in
Height	365.76 cm	12 ft

Dose Points

	X	Y	Z
# 1	189.23 cm	182.88 cm	205.74 cm
	6 ft 2.5 in	6 ft	6 ft 9.0 in

Shields

Shield Name	Dimension	Material	Density
Source	2.77e+07 cm³	Iron	0.00683
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm³	Bq/cm³
Ba-137m	2.0922e+002	7.7410e+012	7.5489e+000	2.7931e+005
Cs-137	2.2116e+002	8.1829e+012	7.9798e+000	2.9525e+005

Buildup
The material reference is : Source

Integration Parameters

X Direction	10
Y Direction	20
Z Direction	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	1.603e+11	1.897e+03	1.951e+03	1.580e+01	1.625e+01
0.0322	2.957e+11	3.669e+03	3.776e+03	2.953e+01	3.039e+01
0.0364	1.076e+11	2.164e+03	2.248e+03	1.230e+01	1.277e+01
0.6616	6.965e+12	1.654e+07	1.725e+07	3.207e+04	3.344e+04
TOTALS:	7.529e+12	1.655e+07	1.726e+07	3.212e+04	3.350e+04

Component or area: 8Q-4 Pit

Model geometry used: Rectangular Volume

Given/Facts:

1. Unshielded probe readings were taken inside the 8Q-4 pit at 1 foot intervals. The highest reading measured was 16.2 mR/hr.

2. There is approximately 927 lbs of piping/equipment within the 8Q-4 pit. (WO 9400911)

Assumptions:

1. The pit was modeled using a conservative approach by obtaining the highest dose reading measured in the pit and moving the dose point to the outside of the volume and the density of the source was determined by using the weight of the equipment inside the pit.

2. All contamination was assumed to be exclusively Cs-137.

3. Material in the pit was assumed to be iron.

Calculation:

Input into the model

Detector position: Flush with top of pit area; centered geometrically over the pit at a distance of 2" from the surface of the volume.
Source dimensions: 6' by 7' by 6'
Reading modeled: 16.2 mR/hr
Source material: Combination of air, piping and components (927 lbs)
Drawings: 904D-127, Rev.12
Work Documents/Surveys: Radiation Protection Survey #122979, WO 9400911

Model prepared by: E.Y. Lauber E.Y. Lauber 20 Jan 04
Signature/Print name/Date

Model peer reviewed by: E.B. Lachapelle E.B. Lachapelle 1/20/04
Signature/Print name/Date

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Grove Engineering

Page : 1
DOS File : 8Q4PitCharacterization_03Dec29EYL.ms6
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Run Time: 8:35:10 AM
Duration : 00:00:01

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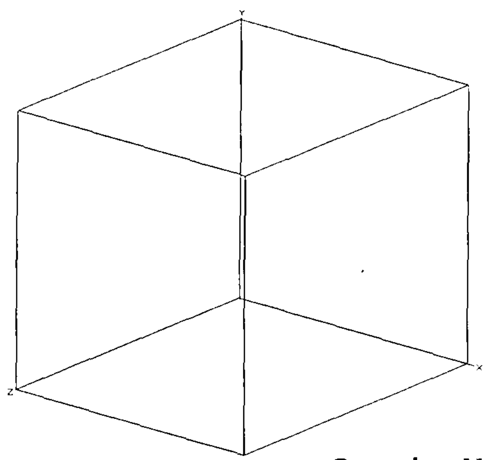
Date: 20 Jan 04
By: [signature]
Checked: EL

Case Title: 8Q-4 Pit
Description: WTF Characterization of 8Q-4 pit at 16.2 mR/hr
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	182.88 cm	6 ft
Width	213.36 cm	7 ft 0.0 in
Height	182.88 cm	6 ft

Dose Points

	X	Y	Z
# 1	187.96 cm	91.44 cm	106.68 cm
	6 ft 2.0 in	3 ft	3 ft 6.0 in

Shields

Shield Name	Dimension	Material	Density
Source	7.14e+06 cm³	Iron	0.05894
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm³	Bq/cm³
Ba-137m	4.8265e-002	1.7858e+009	6.7637e-003	2.5026e+002
Cs-137	5.1020e-002	1.8877e+009	7.1498e-003	2.6454e+002

Buildup
The material reference is : Source

Integration Parameters

X Direction	10
Y Direction	20
Z Direction	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	3.697e+07	1.224e-01	1.275e-01	1.019e-03	1.062e-03
0.0322	6.821e+07	2.416e-01	2.518e-01	1.944e-03	2.027e-03
0.0364	2.482e+07	1.687e-01	1.774e-01	9.585e-04	1.008e-03
0.6616	1.607e+09	6.780e+03	8.355e+03	1.314e+01	1.620e+01
TOTALS:	1.737e+09	6.781e+03	8.355e+03	1.315e+01	1.620e+01

Component or area: 8Q-5 Pit

Model geometry used: Rectangular Volume

Given/Facts:

1. Unshielded probe readings were taken inside the 8Q-5 pit at 1 foot intervals. The highest reading measured was 6 mR/hr.

Assumptions:

1. The pit was modeled using a conservative approach by obtaining the highest dose reading measured in the pit and moving the dose point to the outside of the volume and the density of the source was conservatively assumed to be 1/2 the volume of the pit. (density of 3.93 versus 7.86 g/cm^3).

2. All contamination was assumed to be exclusively Cs-137.

3. Material in the pit was assumed to be iron.

Calculation:
__Input into the model__

Detector position: Flush with top of pit area; centered geometrically over the pit at a distance of 2" from the surface of the volume.
Source dimensions: 5'1.5" by 9' by 12'
Reading modeled: 6 mR/hr
Source material: Combination of air, piping and components (iron assumed to be 1/2 volume of pit at density of 3.93 g/cm^3)
Drawings: 904D-128, Rev.5, 904D-125 Rev. 6
Work Documents/Surveys: Radiation Protection Survey #122979, WO 9400911

Model prepared by: Eric Y Lauber E.Y. Lauber 19 Jan 04
Signature/Print name/Date

Model peer reviewed by: E.B. Lachapelle 1/19/04
Signature/Print name/Date

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Page : 1
DOS File : 8Q5PitCharacterization_04Jan11EYL.ms6
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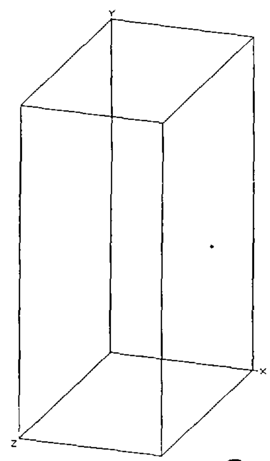
Run Time: 9:02:34 AM
Duration : 00:00:01

File Ref: ______
Date: 12 Jan 04
By: E. Y. Lauler
Checked: EL

Case Title: 8Q-5 Pit
Description: WTF Characterization of 8Q-5 Pit based on 6 mR/hr
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	156.21 cm	5 ft 1.5 in
Width	274.32 cm	9 ft
Height	365.76 cm	12 ft

Dose Points

	X	Y	Z
# 1	161.29 cm	182.88 cm	137.16 cm
	5 ft 3.5 in	6 ft	4 ft 6.0 in

Shields

Shield Name	Dimension	Material	Density
Source	9.56e+05 in³	Iron	3.93
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm³	Bq/cm³
Ba-137m	7.1189e-001	2.6340e+010	4.5421e-002	1.6806e+003
Cs-137	7.5253e-001	2.7844e+010	4.8013e-002	1.7765e+003

Buildup
The material reference is : Source

Integration Parameters

X Direction	10
Y Direction	20
Z Direction	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	5.453e+08	4.686e-26	9.541e-25	3.904e-28	7.947e-27
0.0322	1.006e+09	6.051e-25	2.363e-24	4.870e-27	1.902e-26
0.0364	3.661e+08	4.404e-18	5.105e-18	2.502e-20	2.900e-20
0.6616	2.370e+10	1.301e+03	3.095e+03	2.523e+00	6.000e+00
TOTALS:	2.562e+10	1.301e+03	3.095e+03	2.523e+00	6.000e+00

Appendix E

MicroShield™ Modeling Results for STS Pipeway/Shield Structure Piping and M-8 Riser to STS Piping

Component or area: STS Valve Aisle Jumper J20FV-301

Model geometry used: Cylinder surface - external dose point

Given/Facts:

1. An unshielded probe reading was taken of the jumper within the STS Valve Aisle. The reading that was measured on Jumper J20FV-301 was 1700 mR/hr.

Assumptions:

1. For calculating the curie content of the piping in the STS Pipeway the uCi/cm^2 value of the jumper J20 FV-301 is assumed to be representative of the remaining inaccessible piping.

2. The wall thickness of the jumper was 0.145 inches of stainless steel.

3. The contamination was assumed to be uniformly distributed on the internal surfaces of the jumper and entirely of Cs-137.

Calculation:

Input into the model

Detector position: 2" from the external surface of the jumper.
Source dimensions: cylindrical source with an 18" height and a .805" radius.
Reading modeled: 1700 mR/hr
Source material: N/A
Drawings: 900D-1079 Sht.1, Rev.5
Work Documents/Surveys: Radiation Protection Survey #060042

Model prepared by: E.Y. Lauber 6 Jan 04
Signature/Print name/Date

Model peer reviewed by: E.B. Lachapelle 1/6/04
Signature/Print name/Date

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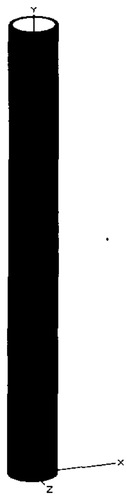
Page : 1
DOS File : JumperJ20-FV301Characterization_03Dec17EYL.ms6
Run Date: January 6, 2004
Run Time: 10:39:02 AM
Duration : 00:00:00

File Ref:
Date: 6 Jan 04
By: [illegible]
Checked: EL

Case Title: Jumper J20 FV-301
Description: STS Valve Aisle Jumper 1700 mR @ contact
Geometry: 10 - Cylinder Surface - External Dose Point



Source Dimensions

Height	45.72 cm	1 ft 6.0 in
Radius	2.045 cm	0.8 in

Dose Points

	X	Y	Z
# 1	7.493 cm	22.86 cm	0 cm
	3.0 in	9.0 in	0.0 in

Shields

Shield Name	Dimension	Material	Density
Cyl. Radius	2.045 in	Air	0.00122
Transition		Air	0.00122
Air Gap		Air	0.00122
Wall Clad	.145 in	Iron	7.86

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	μCi/cm²	Bq/cm²
Ba-137m	7.6670e-002	2.8368e+009	1.3053e+002	4.8296e+006
Cs-137	8.1046e-002	2.9987e+009	1.3798e+002	5.1053e+006

Buildup
The material reference is : Wall Clad

Integration Parameters

Y Direction (axial)	20
Circumferential	20

Results

Energy MeV	Activity photons/sec	Fluence Rate MeV/cm²/sec No Buildup	Fluence Rate MeV/cm²/sec With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	5.873e+07	1.725e-07	1.884e-07	1.437e-09	1.569e-09
0.0322	1.084e+08	6.334e-07	6.928e-07	5.098e-09	5.576e-09
0.0364	3.943e+07	9.406e-05	1.054e-04	5.344e-07	5.989e-07
0.6616	2.553e+09	6.347e+05	8.767e+05	1.230e+03	1.700e+03
TOTALS:	2.759e+09	6.347e+05	8.767e+05	1.230e+03	1.700e+03

Appendix F

STS Pipeway/Shield Structure Piping Surface Area and Cs-137 Curie Inventory Calculation

STS Pipeway/Shield Structure Cs-137 Inventory Calculation as of Survey Date (May 1998)

							Totals
Estimated Linear Feet of Piping[1]	800	330	2,390	2,040	560	330	
Schedule 40 Pipe Inches	3	2 ½	2	1 ½	1	3/4	
Pipe Inside Diameter Inches	3.068	2.469	2.067	1.61	1.049	0.824	
$inches^2$	92,482	30,701	186,144	123,756	22,135	10,246	465,463
cm^2	596,656	198,068	1,200,927	798,425	142,804	66,103	3,002,983
Cs-137 Areal Concentration $\mu ci/cm^2$[2]	138	138	138	138	138	138	
Cs-137 μci	8.23e+07	2.73e+07	1.66e+08	1.10e+08	1.97e+07	9.12e+06	4.14e+08
Cs-137 Curies	8.23e+01	2.73e+01	1.66e+02	1.10e+02	1.97e+01	9.12e+00	4.14e+02

(1) Estimated linear feet of STS Pipeway/Shield Structure piping provided in E-mail, Dan Meess to John Fazio, "Estimated STS HLW Piping," dated December 16, 2003.

(2) From Appendix F MicroShield™ modeling results.

Prepared By: J. M. Fazio 2/13/04

Peer Reviewed By: L. M. Michalczak 2/13/04

Appendix G

Peer Reviewed Scaling Factor Calculation for
STS Valve Aisle Scaling Factor Data

**Scaling Factor Calculation for
STS Valve Aisle Scaling Factor Data**

Project Isotope	STS Valve Aisle Scaling Factors May 2, 2002*	STS Valve Aisle Scaling Factors September 30, 2004
C-14	1.24e-06	1.31e-06
Tc-99	2.13e-04	2.25e-04
I-129	9.86e-10	1.04e-09
U-232	8.83e-06	9.12e-06
U-233	3.39e-06	3.58e-06
U-234	1.62e-06	1.82e-07
U-235	7.19e-07	7.60e-07
Np-237	7.87e-06	8.32e-06
U-238	5.57e-07	5.89e-07
Pu-238	1.50e-03	1.56e-03
Pu-239	4.60e-04	4.86e-04
Pu-240	8.18e-04	8.65e-04
Pu-241	1.06e-02	9.97e-03
Am-241	1.27e-02	1.34e-02
Cm-243	8.99e-05	8.96e-05
Cm-244	2.19e-03	2.11e-03
Cs-137	1.00e+00	1.00e+00
Sr-90	9.61e-01	9.58e-01

* From RIR-403-007

Prepared By: 2/13/04
J. M. Fazio

Peer Reviewed By: 2/13/04
L. M. Michalczak

Appendix H

Waste Tank Farm HLW Legacy Piping Calculations
(THOREX Waste Line 7P120)

Waste Tank Farm HLW Legacy Piping Calculations
THOREX Waste Line 7P120

Project Isotope	THOREX Radionuclide Distribution		
	1/01/1987		9/30/2004
	Curies*	Curies/Gallon**	
C-14	1.30e-01	1.09e-05	1.09e-05
Tc-99	1.04e+02	8.75e-03	8.75e-03
I-129	<1.80e-01	1.51e-05	1.51e-05
U-232	2.74e+00	2.30e-04	1.94e-04
U-233	2.09e+00	1.76e-04	1.76e-04
U-234	2.17e+00	1.83e-04	1.85e-04
U-235	5.17e-03	4.35e-07	4.35e-07
Np-237	3.02e-01	2.54e-05	2.54e-05
U-238	7.11e-05	5.98e-09	5.98e-09
Pu-238	4.80e+02	4.04e-02	3.51e-02
Pu-239	1.54e+01	1.30e-03	1.30e-03
Pu-240	8.09e+00	6.80e-04	6.80e-04
Pu-241	8.50e+02	7.15e-02	3.04e-02
Am-241	2.41e+02	2.03e-02	2.11e-02
Cm-243	2.34e-01	1.97e-05	1.28e-05
Cm-244	1.37e+01	1.15e-03	5.83e-04
Cs-137	4.57e+05	3.84e+01	2.56e+01
Sr-90	4.54e+05	3.82e+01	2.48e+01

* From Table 12 of Topical Report DOE/NE/44139-14 "High-Level Waste Characterization at West Valley, " June 2, 1986[16].

** For 11,889 gallons of THOREX waste as reported in Reference 16.

Prepared By: J. M. Fazio 2/13/04

Peer Reviewed By: L. M. Michalczak 2/13/04

For the THOREX Waste Pipeline 7P120, a residual volume is conservatively estimated to be 7 gallons as shown below:

Reference Drawings: 8A-L-1, 8A-L-2, 8A-L-9, 8A-L-12, 15R-L-81		
	Length (Feet)	700
	Diameter (Inches)	3
	Schedule	40
Calculate	Line Volume (Gallons)	300
	Assume 2% Residual Waste Volume (Gallons) (6 gallons plus 1 gallon in dead leg)	7

For a 7-gallon residual THOREX waste volume and using the decay corrected THOREX waste radionuclide distribution concentrations, the radionuclide inventory for Line 7P-120 is shown below:

Line 7P120 Inventory		
Radionuclide	**THOREX Radionuclide Distribution Decayed to 9/30/2004 (Ci/gal)**	**Inventory as of September 30, 2004 2% (7 Gallons) Residual (Curies)**
C-14	1.09e-05	7.63e-05
Tc-99	8.75e-03	6.13e-02
I-129	1.51e-05	1.06e-04
U-232	1.94e-04	1.36e-03
U233/234		
U-233	1.76e-04	1.23e-03
U-234	1.85e-04	1.30e-03
U-235/236		
U-235	4.35e-07	3.05e-06
Np-237	2.54e-05	1.78e-04
U-238	5.98e-09	4.19e-08
Pu-238	3.51e-02	2.46e-01
Pu-239	1.30e-03	9.10e-03
Pu-240	6.80e-04	4.76e-03
Pu-241	3.04e-02	2.13e-01
Am-241	2.11e-02	1.48e-01
Cm-243	1.28e-05	8.96e-05
Cm-244	5.83e-04	4.08e-03
Cs-137	2.56e+01	1.79e+02
Sr-90	2.48e+01	1.74e+02

Prepared By: J. M. Fazio ~~2/13/04~~ 2/13/04

Peer Reviewed By: L. M. Michalczak 2/13/04

Appendix I

Waste Tank Farm HLW Legacy Piping Calculations
(8D-2 WasteTransfer Line 7P113)

Tank 3D-2		
Radionuclide	Sample 02-1765 December 19, 2002 (μCi/ml)	Decay Corrected to September 30, 2004 (μCi/ml)
C-14	9.79e-05	9.79e-05
Tc-99	1.16e-04	1.16e-04
I-129	<8.21e-05	8.21e-05
U-232	2.06e-05	2.02e-05
U-233	8.60e-06	8.60e-06
U-234	4.10e-06	4.11e-06
U-235	3.30e-08	3.30e-08
Np-237	5.17e-06	5.17e-06
U-238	4.21e-07	4.21e-07
Pu-238	1.37e-03	1.35e-03
Pu-239	9.07e-04	9.07e-04
Pu-240	6.93e-04	6.93e-04
Pu-241	1.34e-02	1.23e-02
Am-241	5.77e-03	5.79e-03
Cm-243	2.49e-05	2.38e-05
Cm-244	6.51e-04	6.08e-04
Cs-137	2.32e+00	2.23e+00
Sr-90	1.88e-01	1.80e-01

Prepared By: J. M. Fazio 2/13/04

Peer Reviewed By: L. M. Michalczak 2/17/04

For the Tank 8D-2 Pipeline 7P113, a residual volume is conservatively estimated to be 15 gallons as shown below:

Reference Drawings: 8A-L-1, 8A-L-2, 8A-L-9, 8A-L-12, 15R-L-81		
	Length (Feet)	50
	Diameter (Inches)	3
	Schedule	40
Calculate	Line Volume (Gallons)	20
	Assume 2% Residual Waste Volume (Gallons)	4

For a 15 gallon residual waste volume and using the decay corrected Tank 3D-2 waste radionuclide distribution concentrations, the radionuclide inventory for Line 7P-113 is shown below:

Radionuclide	**Tank 3D-2 Sample 02-1765 Decay Corrected to September 30, 2004 (μCi/ml)**	**7P113 Inventory as of September 30, 2004 2% (4 Gallons) Residual (Curies)**
C-14	9.97e-05	1.48e-06
Tc-99	1.16e-04	1.76e-06
I-129	8.21e-04	1.24e-06
U-232	2.02e-05	3.06e-07
U-233	8.60e-06	1.30e-07
U-234	4.11e-06	6.22e-08
U-235	3.30e-08	5.00e-10
Np-237	5.17e-06	7.83e-08
U-238	4.21e-07	6.37e-09
Pu-238	1.35e-03	2.04e-05
Pu-239	9.07e-04	1.37e-05
Pu-240	6.93e-04	1.05e-05
Pu-241	1.23e-02	1.86e-04
Am-241	5.79e-03	8.77e-05
Cm-243	2.38e-05	3.60e-07
Cm-244	6.08e-04	9.21e-06
Cs-137	2.23e+00	3.38e-02
Sr-90	1.80e-01	2.73e-03

Prepared By: 2/13/04
J. M. Fazio

Peer Reviewed By: 2/17/04
L. M. Michalczak

Appendix J

MicroShield™ Modeling Results for M-8 Riser Pump Pit

Component or area: M-8 Pit

Model geometry used: Rectangular Volume

Given/Facts:

1. Unshielded probe readings were taken inside the M-8 pit. The highest reading measured was 860 mR/hr.

Assumptions:

1. The pit was modeled using a conservative approach by obtaining the highest dose reading measured in the pit and moving the dose point to the outside of the volume. The density of the source was determined by using the weight of the equipment inside the pit.

2. The amount and weight of the equipment was estimated from drawings. Each piece of equipment was identified, put into a file with its dimensions and constituents and a volume estimated. The total volume was calculated with an additional 50% of the total added as a conservative measure.(see attached peer reviewed calculations)

3. All contamination was assumed to be exclusively Cs-137.

4. Material in the pit was assumed to be iron.

5. The pit is assumed to be a regular rectangular shape.

Calculation:

<u>Input into the model</u>

Detector position: Flush with top of pit area; centered geometrically over the pit at a distance of 2" from the surface of the volume.
Source dimensions: 6' 3" by 5' by 7' 51/2"
Reading modeled: 860 mR/hr
Source material: Combination of air, piping and components (3005 lbs. see attached peer reviewed calculations)
Drawings: 900D-1305 sht.1, sht.2 and sht.10; 900D-1170
Work Documents/Surveys: WO 0002260

Model prepared by: Eric Y Lauber E.Y. Lauber 27 Jan 04
Signature/Print name/Date

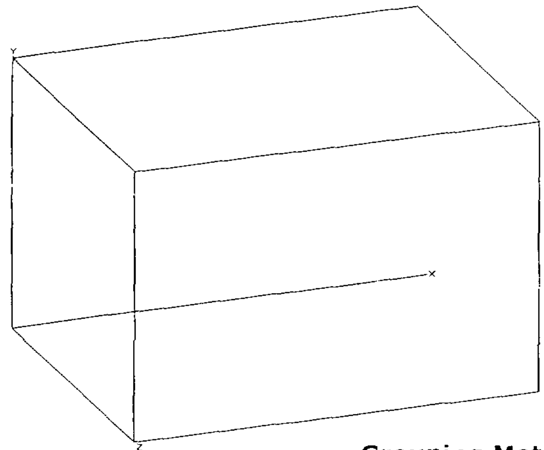
Model peer reviewed by: E.B. Lachapelle E.B. Lachapelle 1/27/04
Signature/Print name/Date

MicroShield v6.02 (6.02-0000)
Grove Engineering

Page : 1
DOS File : M8PitCharacterization_04Jan12EYL.ms6
Run Date: January 27, 2004
Run Time: 11:12:56 AM
Duration : 00:00:01

File Ref: ________
Date: 27 Jan 04
By: Eva J. Lander
Checked: EL

Case Title: M-8 Pit
Description: WTF Characterization of M-8 Pit based on 860 mR/hr.
Geometry: 13 - Rectangular Volume



Source Dimensions

Length	227.33 cm	7 ft 5.5 in
Width	190.5 cm	6 ft 3.0 in
Height	152.4 cm	5 ft 0.0 in

Dose Points

	X	Y	Z
# 1	232.41 cm	76.2 cm	95.25 cm
	7 ft 7.5 in	2 ft 6.0 in	3 ft 1.5 in

Shields

Shield Name	Dimension	Material	Density
Source	6.60e+06 cm^3	Iron	0.2067
Air Gap		Air	0.00122

Source Input
Grouping Method : Actual Photon Energies

Nuclide	curies	becquerels	$\mu Ci/cm^3$	Bq/cm^3
Ba-137m	3.4567e+000	1.2790e+011	5.2375e-001	1.9379e+004
Cs-137	3.6540e+000	1.3520e+011	5.5364e-001	2.0485e+004

Buildup
The material reference is : Source

Integration Parameters

X Direction	10
Y Direction	20
Z Direction	20

Results

Energy MeV	Activity photons/sec	Fluence Rate $MeV/cm^2/sec$ No Buildup	Fluence Rate $MeV/cm^2/sec$ With Buildup	Exposure Rate mR/hr No Buildup	Exposure Rate mR/hr With Buildup
0.0318	2.648e+09	1.582e-01	1.677e-01	1.318e-03	1.397e-03
0.0322	4.885e+09	3.487e-01	3.701e-01	2.806e-03	2.979e-03
0.0364	1.778e+09	6.282e-01	6.751e-01	3.569e-03	3.836e-03
0.6616	1.151e+11	2.782e+05	4.436e+05	5.393e+02	8.600e+02
TOTALS:	1.244e+11	2.782e+05	4.436e+05	5.393e+02	8.600e+02

Estimate of Mass of Components in the 8D-2 M-8 Pump Pit

Description	Dimensions						Ref Dwg	Volume in^3	Mass lbs
Seal Ring	46	in diameter	0.25	in thick			900D-1170	415	120
28"-150 lb weld neck flange							900D-1170	1207	350
28" riser	28	in diameter	0.75	in thick	31.2	in long	900D-1305 sh 1	2057	597
Water Spray Upper	3/4	in diameter	Schedule 40		225	in long	900D-1305 sh 1	60	17
Water Spray Lower	3/4	in diameter	Schedule 40		225	in long	900D-1305 sh 1	60	17
Culvert	18	in diameter	Schedule 40		6.5	in long	900D-1305 sh 1	206	60
Culvert Seal	19 1/8	in diameter	3/8	in thick			900D-1305 sh 2	108	31
Culvert Drain Trough top & bottom	6	in wide	62.8	in Long	1/4	in thick	900D-1305 sh 2	188	55
Culvert Drain Trough side	22	in high	31.4	in Long	1/4	in thick	900D-1305 sh 2	173	50
Gussets	27	in high	15	in Long	1/2	in thick	900D-1305 sh 2	608	176
Motor Extension	10	in diameter	Schedule 40		90	in high	900D-1305 sh10	1031	299
Pump Discharge Piping	2 1/2	in diameter	Schedule 40		15	ft long	900D-1305	287	83
Pump Discharge Piping Spare	2 1/2	in diameter	Schedule 40		5	ft long	900D-1305	96	28
Culvert Drain Piping	2	in diameter	Schedule 40		5	ft long	900D-1305	58	17
Valve Aisle Sump Drain	2 1/2	in diameter	Schedule 40		5	ft long	900D-1305	96	28
STS Return Piping	2 1/2	in diameter	Schedule 40		5	ft long	900D-1305	96	28
Casing Drain Piping	1 1/2	in diameter	Schedule 40		20	ft long	900D-1305	164	48
							TOTAL	6909	2004
							50% conservatism	10364	3005

Prepared By J.M. Fazio 1/22/04

Peer Reviewed By L.M. Michalczak 1/22/04

Appendix K

M-8 Pit to STS Piping Surface Area and Cs-137 Curie Inventory Calculation

M-8 Pump Pit to STS Piping Cs-137 Inventory Calculation as of Survey Date May 1988

Estimated Linear Feet of Piping[1]	900
Schedule 40 Pipe (Inches)	2 ½
Pipe Inside Diameter (Inches)	2.469
inches ^{2}	83728.7
cm^2	540184.3
Cs-137 areal concentration $\mu ci/cm^2$[2]	138
Cs-137 μCi	74545428
Cs-137 Curies	74.5

(1) Estimated linear feet of STS Pipeway/Shield Structure piping provided in e-mail from D. C. Meess to J. M. Fazio, "Estimated STS HLW Piping," December 16, 2003.

(2) From Appendix E MicroShield™ Modeling results.

Prepared By: L. Powell for J. M. Fazio 2/16/04
J. M. Fazio

Peer Reviewed By: L. M. M. 2/16/04
L. M. Michalczak

Appendix L

Peer Reviewed Radionuclide Inventory for the Balance of the Waste Tank Farm

	Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5	HLW Transfer Trench Piping	HLW Legacy Piping Pipeline 7P113 to Tank 8D-2	HLW Legacy Piping Pipeline 7P120 to Tank 8D-4	STS Pipeway/ Shield Structure	M-8 Riser Pump Pit Piping	Associated Piping (M-8 Pump Pit to STS)
Cs-137 Curies from MicroShield™	2.22e+02 (See Note 1)	1.18e+02 (See Table 7)	N/A	N/A	414.1 (See Appendix F)	3.7	74.5 (See Appendix K)
Cs-137 Curies Aged to 9/30/04	(See Note 2)	(See Note 2)	N/A	N/A	392.1	3.35	64.3
Gallons of Liquid	N/A	N/A	4 (See Appendix I)	7 (See Appendix H)	N/A	N/A	N/A
Project Isotope	**Aged Batch 10 Scaling Factors**		**Aged Tank 3D-2 Analytical Results (VAST 02-1767) (μCi/ml)**	**Aged THOREX Radionuclide Distribution**	**Aged STS Valve Aisle Scaling Factors**		
C-14	2.03e-07	2.03e-07	9.79e-05	1.09e-05	1.31e-06	1.31e-06	1.31e-06
Tc-99	3.51e-05	3.51e-05	1.16e-04	8.75e-03	2.25e-04	2.25e-04	2.25e-04
I-129	1.62e-10	1.62e-10	8.21e-05	1.51e-05	1.04e-09	1.04e-09	1.04e-09
U-232	3.85e-06	3.85e-06	2.02e-05	1.94e-04	9.12e-06	9.12e-06	9.12e-06
U-233	1.49e-06	1.49e-06	8.60e-06	1.76e-04	3.58e-06	3.58e-06	3.58e-06
U-234	5.73e-07	5.73e-07	4.11e-06	1.85e-04	1.72e-06	1.72e-06	1.72e-06
U-235	1.58e-08	1.58e-08	3.30e-08	4.35e-07	7.60e-07	7.60e-07	7.60e-07
Np-237	8.30e-06	8.30e-06	5.17e-06	2.54e-05	8.32e-06	8.32e-06	8.32e-06
U-238	1.41e-07	1.41e-07	4.21e-07	5.98e-09	5.89e-07	5.89e-07	5.89e-07
Pu-238	1.55e-03	1.55e-03	1.35e-03	3.51e-02	1.56e-03	1.56e-03	1.56e-03
Pu-239	4.52e-04	4.52e-04	9.07e-04	1.30e-03	4.86e-04	4.86e-04	4.86e-04
Pu-240	3.21e-04	3.21e-04	6.93e-04	6.80e-04	8.65e-04	8.65e-04	8.65e-04
Pu-241	9.96e-03	9.96e-03	1.23e-02	3.04e-02	9.97e-03	9.97e-03	9.97e-03
Am-241	1.33e-02	1.33e-02	5.79e-03	2.11e-02	1.34e-02	1.34e-02	1.34e-02
Cm-243	8.96e-05	8.96e-05	2.38e-05	1.28e-05	8.96e-05	8.96e-05	8.96e-05
Cm-244	2.10e-03	2.10e-03	6.08e-04	5.83e-04	2.11e-03	2.11e-03	2.11e-03
Cs-137	1.00e+00	1.00e+00	2.23e+00	2.56e+01	1.00e+00	1.00e+00	1.00e+00
Sr-90	9.54e-01	9.54e-01	1.88e-01	1.80e-01	9.58e-01	9.58e-01	9.58e-01

Project Isotope	Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5	HLW Transfer Trench Piping	HLW Legacy Piping Pipeline 7P113 to Tank 8D-2	HLW Legacy Piping Pipeline 7P120 to Tank 8D-4	STS Pipeway/ Shield Structure Piping	M-8 Riser Pump Pit	Associated Piping (M-8 Pump Pit to STS)	Totals
Balance of Tank Farm Inventory Decayed/Ingrown to September 30, 2004								
C-14	4.52e-05	2.40e-05	1.48e-06	7.63e-05	5.14e-04	4.39e-06	8.42e-05	7.49e-04
Tc-99	7.79e-03	4.14e-03	1.76e-06	6.13e-02	8.82e-02	7.54e-04	1.45e-02	1.77e-01
I-129	3.59e-08	1.91e-08	1.24e-06	1.06e-04	4.08e-07	3.48e-09	6.69e-08	1.19e-04
U-232	8.56e-04	4.55e-04	3.06e-07	1.36e-03	3.58e-03	3.06e-05	5.86e-04	6.86e-03
U-233	3.32e-04	1.76e-04	1.30e-07	1.23e-03	1.40e-03	1.20e-05	2.30e-04	3.39e-03
U-234	1.27e-04	6.76e-05	6.22e-08	1.30e-03	6.74e-04	5.76e-06	1.11e-04	2.28e-03
U-235	3.50e-06	1.86e-06	5.00e-10	3.05e-06	2.98e-04	2.55e-06	4.89e-05	3.58e-03
Np-237	1.84e-03	9.79e-04	7.83e-08	1.78e-04	3.26e-03	2.79e-05	5.35e-04	6.82e-03
U-238	3.13e-05	1.66e-05	6.37e-09	4.19e-08	2.31e-04	1.97e-06	3.79e-05	3.19e-04
Pu-238	3.45e-01	1.83e-01	2.04e-05	2.46e-01	6.12e-01	5.23e-03	1.00e-01	1.49e+00
Pu-239	1.00e-01	5.34e-02	1.37e-05	9.10e-03	1.91e-01	1.63e-03	3.12e-02	3.86e-01
Pu-240	7.13e-02	3.79e-02	1.05e-05	4.76e-03	3.39e-01	2.90e-03	5.56e-02	5.12e-01
Pu-241	2.21e+00	1.18e+00	1.86e-04	2.13e-01	3.91e+00	3.34e-02	6.41e-01	8.18e+00
Am-241	2.96e+00	1.57e+00	8.77e-05	1.48e-01	5.25e+00	4.49e-02	8.62e-01	1.08e+01
Cm-243	1.99e-02	1.06e-02	3.60e-07	8.96e-05	3.51e-02	3.00e-04	5.76e-03	7.18e-02
Cm-244	4.67e-01	2.48e-01	9.21e-06	4.08e-03	8.27e-01	7.07e-03	1.36e-01	1.69e+00
Cs-137	2.22e+02	1.18e+02	3.38e-02	1.79e+02	3.92e+02	3.35e+00	6.43e+01	9.79e+02
Sr-90	2.12e+02	1.13e+02	2.73e-03	1.74e+02	3.76e+02	3.21e+00	6.16e+01	9.39e+02

Notes:

1 Sum of MicroShield™ modeling results: 8Q-1 (0.31 Ci); 8Q-2 (221 Ci); 8Q-4 (0.051 Ci); 8Q-5 (0.75 Ci).

2 The aging of MicroShield™ results was not required since, per the CMP, the surveys were taken within one year of September 30, 2004.

Prepared By: 2/25/04
J. M. Fazio

Peer Reviewed By: 2/25/04
L. M. Michalczak

Appendix M

Technical Review and Approval Panel Consensus Statement

FACILITY CHARACTERIZATION PROJECT

Technical Review and Approval Panel
Consensus Statement

Unit Name (s): Balance of the Waste Tank Farm

Summary of Technical Approach That Was Utilized:

From the review of the operational processes conducted in the Waste Tank Farm, the available historic information, and previously generated data, the following areas were identified as potential key curie contributors:

- HLW Transfer Trench Piping
- Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5
- STS Pipeway/Shield Structure Piping
- Waste Tank Farm HLW Legacy Piping
- M-8 Riser Pump Pit and associated piping

HLW Transfer Trench Piping

The HLW Transfer Trench piping is contained within the 500 foot long concrete waste transfer trench. The approximately 3,000 feet of two- and three-inch Schedule 40 stainless steel piping was used to convey wastes between tanks within the Waste Tank Farm and to the Vitrification Facility for solidification. The interior of the HLW Transfer Trench was last surveyed in January 2002. However, this data could not be validated due to a discrepancy in the probe and rate meter. Therefore, new dose rate measurements were needed for the Transfer Trench. Using the new dose rates and the Batch 10 vitrification run isotopic data, the Trench Transfer piping was then modeled, scaling factors developed, and a curie estimate was calculated for the residual activity in the transfer piping.

Pits 8Q-1, 8Q-2, 8Q-4, and 8Q-5

The 8Q-1, 8Q-2, 8Q-4, and 8Q-5 Pits are approximately 6 feet deep and vary in size from 6 feet by 7 feet to 13.5 feet by 12 feet. Each pit accommodates the removal pump, jumpers, and flow monitoring equipment required to process the waste out of the respective waste tank. The interior of the 8Q-1, 8Q-2, 8Q-4, and 8Q-5 Pits were last surveyed in January 2002. However, this data could not be validated due to a discrepancy in the probe and rate meter. Therefore, new dose rate measurements were needed for these pits. Using the new dose rates and the Batch 10 vitrification run isotopic data, the pits were then modeled, scaling factors developed, and a curie estimate was calculated.

STS Pipeway/Shield Structure Piping

The STS Pipeway/Shield Structure is located on top of the Tank 8D-1 vault adjacent to the first floor of the support building. This concrete and steel structure contains numerous piping runs and structural members that support the STS equipment in Tank 8D-1. These facilities were designed for the pretreatment of the HLW PUREX supernatant and sludge wash solutions. There was no historical radiological survey data located for the STS Pipeway/Shield Structure. However, jumpers in the valve aisle have been surveyed which would be radiologically similar to the pipeway/shield structure piping. Dose rate measurements of a valve aisle jumper taken in May 1998 were 1,700 mR/hr. Using the 1998 dose rate measurement and the existing STS Valve Aisle scaling factors, the pipeway/shield structure piping was then modeled and a curie estimate was calculated.

Waste Tank Farm HLW Legacy Piping

The HLW Legacy Piping originate at floor nozzles in the CPC. Each line is approximately 500 and 700 feet long and constructed of 3-inch Schedule 40 stainless steel pipe and gravity drain to HLW waste storage tanks in the Waste Tank Farm. These lines were used for the transfer of all reprocessing wastes to the Waste Tank Farm. PUREX HLW was transferred to Tank 8D-2 via Line 7P-113 and for the transfer of THOREX waste to Tank 8D-4, Line 7P-120 was used. Subsequent to reprocessing, Line 7P-113 has been flushed by the process plant decontamination solutions and other miscellaneous wastes, such as cell sumps and laboratory wastes, that were routinely collected in Tank 7D-2 and sampled in Tank 3D-2 before being transferred to Tank 8D-2. The other HLW Pipeline 7P-112, which serviced Tank 8D-1, was never used as Tank 8D-1 was the spare HLW receiver tank. Using existing data to compute the radioisotopic concentrations of the Tank 7D-2 waste stream and the THOREX waste stream, a curie estimate was calculated volumetrically for residual wastes remaining in the piping.

M-8 Riser Pump Pit and Associated Piping

The M-8 Pump Pit is 75 inches wide by 60 inches long by 90 inches deep and fabricated from 1/4-inch stainless steel. The associated supply and return transfer piping plus two spare lines are 2 ½-inch diameter Schedule 40 304L stainless steel doubly contained in a 200 foot long 20 inch diameter culvert pipe. This system was used to transport the PUREX supernatant, sludge wash, and sodium bearing waste water to the STS for treatment.

The interior of the M-8 Riser Pump Pit was last surveyed in November and December 2000 during STS flushing operations. Surveys were taken through existing valve access ports in the pit cover located 65 inches from the top of the pit covers into the pit. Dose rates ranged from 722 mR/hr to 1,244 mR/hr. Using the 2000 dose rate measurement and the existing STS Valve Aisle scaling factors, the pipeway/shield structure piping was then modeled and a curie estimate was calculated (see Section 7.5.1).

There was no historical radiological survey data located for the associated piping of the M-8 Riser. However, jumpers in the valve aisle have been surveyed which would be radiologically similar to this piping. Dose rate measurements of a valve aisle jumper taken in May 1998 were 1,700 mR/hr. Using the 1998 dose rate measurement and the existing STS Valve Aisle scaling factors, the associated piping of the M-8 Riser was then modeled and a curie estimate was calculated.

Curie Estimate

Conservative curie estimates for the balance of the Waste Tank Farm (aged to September 30, 2004) are as follows:

Total Performance Assessment Radionuclides for Balance of the Waste Tank Farm*
(Decayed and Ingrown to September 30, 2004)

Project Isotopes	Curie Estimate for Balance of the Waste Tank Farm
C-14	7.49e-04
Tc-99	1.77e-01
I-129	1.19e-04
U-232	6.86e-03
U-233	3.39e-03
U-234	2.28e-03
U-235	3.58e-03
Np-237	6.82e-03
U-238	3.19e-04
Pu-238	1.49e+00
Pu-239	3.86e-01
Pu-240	5.12e-01
Pu-241	8.18e+00
Am-241	1.08e+01
Cm-243	7.18e-02
Cm-244	1.69e+00
Cs-137*	9.79e+02
Sr-90**	9.39e+02

* The method for choosing the project isotopes is outlined in WVDP-403, "Characterization Management Plan for the Facility Characterization Project" (CMP).

** Cs-137 and Sr-90 are not critical radionuclides for the outcome of the performance assessment but are reported for completeness per WVDP-403.

Using best engineering judgement and available information, the following listed Technical Review and Approval Panel Members have reviewed the technical approach and resultant conservative curie estimate for the stated area/cell and have reached consensus that the approach and resultant estimate are technically sound for purposes of this project's scope as identified in the Characterization Management Plan for the Facility Characterization Project (WVDP-403).

Project Manager:	L. E. Rowell	L E Rowell 2/24/04 (Signature/date)
Project/Balance of Tank Farm Cell Lead:	J. M. Fazio	for J. Fazio 2/16/04 (Signature/date)
Project Cell Lead(s):	E. B. Lachapelle	2/16/04 (Signature/date)
Radiation Engineering and Dosimetry:	E. Y. Lauber	For E.L. 2-17-04 (Signature/date)
Radiation Protection:	R. L. Hazard	2/17/04 (Signature/date)
Decommissioning Planning:	D. R. Westcott	DRWestcott 2/16/04 (Signature/date)
Analytical and Process Chemistry:	C. J. Maddigan	2/16/04 (Signature/date)

WVNSCO RECORD OF REVISION

Rev. No.	Description of Changes	Revision On Page(s)	Dated
0	Original Issue	All	02/25/04
	Departments affected by this document are Facility Characterization Project and Decommissioning Planning.		